YASKAWA

EtherNet/IP™ Option CM092
Technical Manual

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EtherNet/IP™
conformance tested

EtherNet/IP™

Document Number: TM.AFD.26
Models: CIMR-F7U, CIMR-G7U, CIMR-P7U, CIMR-E7U, CIMR-G5M(Spec F), CIMR-G5M(600V), G5HHP

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Warnings and Cautions

⚠ WARNING

YASKAWA manufactures component parts that can be used in a wide variety of industrial applications. The selection and application of YASKAWA products remain the responsibility of the equipment designer or end user. YASKAWA accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any YASKAWA product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and to fail safely under all circumstances. All products designed to incorporate a component part manufactured by YASKAWA must be supplied to the end user with appropriate warnings and instructions as to that part's safe use and operation. Any warnings provided by YASKAWA must be promptly provided to the end user. YASKAWA offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the YASKAWA manual. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED. YASKAWA assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products..

⚠ WARNING

- Read and understand this manual before installing, operating, or servicing this drive. All warnings, cautions, and instructions must be followed. All activity must be performed by qualified personnel. The drive must be installed according to this manual and local codes.
- Do not connect or disconnect wiring while the power is on. Do not remove covers or touch circuit boards while the power is on. Do not remove or insert the digital operator while power is on.
- Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. Status indicator LEDs and Digital Operator display will be extinguished when the DC bus voltage is below 50VDC. To prevent electric shock, wait at least 5 minutes after all indicators are OFF and measure the DC bus voltage level to confirm that it is at a safe level.
- Do not perform a withstand voltage test on any part of the unit. This equipment uses sensitive devices and may be damaged by high voltage.
- The drive is not suitable for circuits capable of delivering more than the specified RMS symmetrical amperes. Install adequate branch short circuit protection per applicable codes. Refer to the specification. Failure to do so may result in equipment damage and/or personal injury.
- Do not connect unapproved LC or RC interference suppression filters, capacitors, or over voltage protection devices to the output of the drive. Capacitors may generate peak currents that exceed drive specifications.
- To avoid unnecessary fault displays, caused by contactors or output switches placed between drive and motor, auxiliary contacts must be properly integrated into the control logic circuit.
- YASKAWA is not responsible for any modification of the product made by the user, doing so will void the warranty. This product must not be modified.
- Verify that the rated voltage of the drive matches the voltage of the incoming power supply before applying power.
- To meet CE directives, proper line filters and proper installation are required.
- Some drawings in this manual may be shown with protective covers or shields removed, to describe details. These must be replaced before operation.
- Observe Electrostatic Discharge Procedures when handling the drive and drive components to prevent ESD damage.
- The attached equipment may start unexpectedly upon application of power to the drive. Clear all personnel from the drive, motor and machine area prior to applying power. Secure covers, couplings, shaft keys, machine beds and all safety equipment before energizing the drive.

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Introduction

This manual explains the specifications and handling of the Yaskawa *EtherNet/IP Option Card* for the Yaskawa F7U, G7U, P7U, E7U, GPD515/G5M (F Spec), GPD515/G5 (600V) and G5HHP drives. The *EtherNet/IP Option Card* connects the drive to an *EtherNet/IP* network and facilitates the exchange of data. In this document, the word "inverter", "AC drive" and "drive" may be used interchangeably.

To ensure proper operation of this product, read and understand this manual. For details on installation and operation of the drive, refer to the appropriate drive technical manual. For details on specific parameters, refer to the appropriate drive user and/or programming manual. All technical manuals and EDS and support files can be found on the CD that came with the drive, CD.AFD7.01. They are also available for download at www.Yaskawa.com. Refer to the web site for the most recent information.

For information on EtherNet/IP contact the Open DeviceNet Vendors Organization at www.odva.org.

F7U Drive User Manual document reference **TM.F7.01**
F7U Drive Programming Manual document reference **TM.F7.02**
F7U Drive Parameter Access Manual document reference **TM.F7.11**
G7U Drive Technical Manual document reference **TM.G7.01**
P7U Drive User Manual document reference **TM.P7.01**
P7U Drive Programming Manual document reference **TM.P7.02**
E7U Drive User Manual document reference **TM.E7.01**
E7U Drive Programming Manual document reference **TM.E7.02**
GPD515/G5M(Spec F) Technical Manual document reference **TM 4515**
GPD515/G5M(Spec F) MODBUS® Technical Manual document reference **TM 4025**
G5HHP Technical Manual document reference **TM.G5HHP.01**
EtherNet/IP Installation Guide document reference **IG.AFD.26**
Application Note - Using the Yaskawa AC Drive "EtherNet/IP" Option with Controllogix / Compactlogix Programmable Controllers document reference **AN.AFD.09**
Application Note - Commissioning the Yaskawa AC Drive "EtherNet/IP" Option with the Rockwell BOOTP/DHCP Server document reference **AN.AFD.10**

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Chapter 1 Installation

This section describes how to install and set up the EtherNet/IP Option Card.

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Installation Check Sheet

The following is a quick reference checklist to install and configure the *EtherNet/IP Option Card*. Make a copy of this page and check-off ☑ each item as it is completed. For detailed information please refer to the detailed sections that follow.

1. ☐ **Unpack the *EtherNet/IP Option Card* and verify that all components are present and undamaged.**

2. ☐ **Connect and power the drive and verify that the drive runs normally.**
   Refer to the appropriate user, programming or technical manual for details on connecting and starting the AC drive.

4. ☐ **Install the *EtherNet/IP Option Card* on the drive.**

5. ☐ **Connect the *EtherNet/IP Option Card* to the EtherNet/IP communication network.**

6. ☐ **Apply power to the drive and check diagnostic and normal operation LED status.**

> ⚠ **WARNING!**
> Dangerous voltages in excess of 400VDC (230V drives) or 800VDC (460V drives) are present at the DC bus terminals of the drive.

7. ☐ **Configure the PC for a network connection.**

8. ☐ **Configure the *EtherNet/IP Option Card.***

9. ☐ **Finish the *EtherNet/IP Option Card* Installation:**

   Refer to the documentation included with the EtherNet/IP configuration utility supplied with the EtherNet/IP Master controller. Verify that the drive appears on the EtherNet/IP network at the correct IP address, Subnet Mask, gateway and server.

Unpack and Inspect

Unpack the *EtherNet/IP Option* kit and verify that all components are present and undamaged.

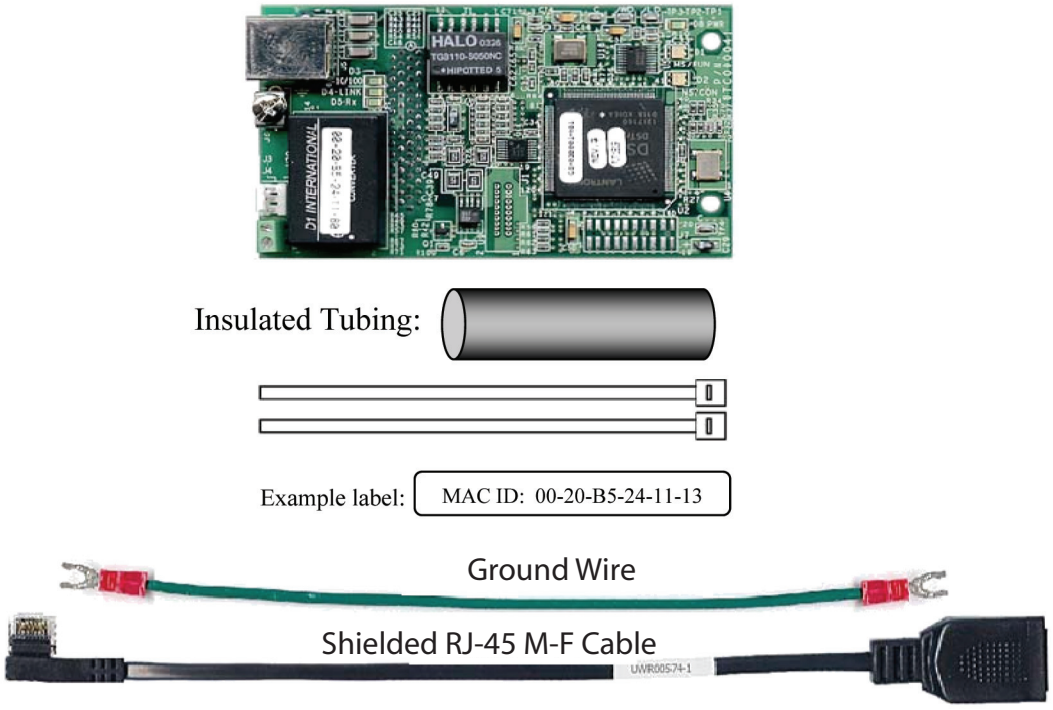

Fig 1.1 – CM092 Option Kit

Table 1.1 – CM092 Option Kit Contents	
CM092 EtherNet/IP Option Kit Parts	**Qty.**
EtherNet/IP Option Card	1
Shielded RJ-45 M-F Cable	1
Ground Wire	1
4”x1” Insulated Tubing	1
Cable Ties	2
MAC ID Label (Unique for each *EtherNet/IP Option Card*)	1
Installation Guide (IG.AFD.26)	1

◆ Verify Drive Operation

1. **Connect power to the Yaskawa AC drive and verify that the drive functions correctly.**
   This includes running the drive from the operator keypad. Refer to the appropriate drive technical manual for information on connecting and operating the drive.

2. **Remove power from the drive and wait for the charge lamp to be completely extinguished.**
   Wait at least five additional minutes for the drive to be completely discharged. Measure the DC bus voltage and verify that it is at a safe level.

> ⚠ **WARNING!**
> Dangerous voltages in excess of 400VDC (230V drives) or 800VDC (460V drives) are present at the DC bus terminals of the drive.

Install the EtherNet/IP Option Card

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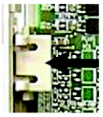
◆ Remove the Operator Keypad and Drive Cover

1. Remove the operator keypad.
2. Remove the terminal and control covers.
3. Remove the option card hold-down by carefully compressing the top and bottom until it becomes free of its holder. Lift it out.



Option card
hold-down

◆ Install the EtherNet/IP Option Card on the Drive

1. Connect the RJ-45 M-F cable supplied in this kit to the *EtherNet/IP Option Card*.
2. Connect the ground wire supplied to ground terminal J6 on the *EtherNet/IP Option Card*.
3. Align the J2 connector on the back of the *EtherNet/IP Option Card* with its mating 2CN connector on the drive control card.
4. Align the two standoffs on the front of the drive control board with the two holes on the right side of the *EtherNet/IP Option Card*.
5. Press the *EtherNet/IP Option Card* firmly onto the drive 2CN connector and standoffs until the J2 connector is fully seated on 2CN and the drive standoffs have locked into their appropriate holes.
6. Route the RJ-45 M-F cable and the ground wire along the left-inside of the AC drive enclosure.
7. Replace the option card hold-down.
8. Connect the ground wire from the option card terminal J6 to the terminal assembly ground connection.

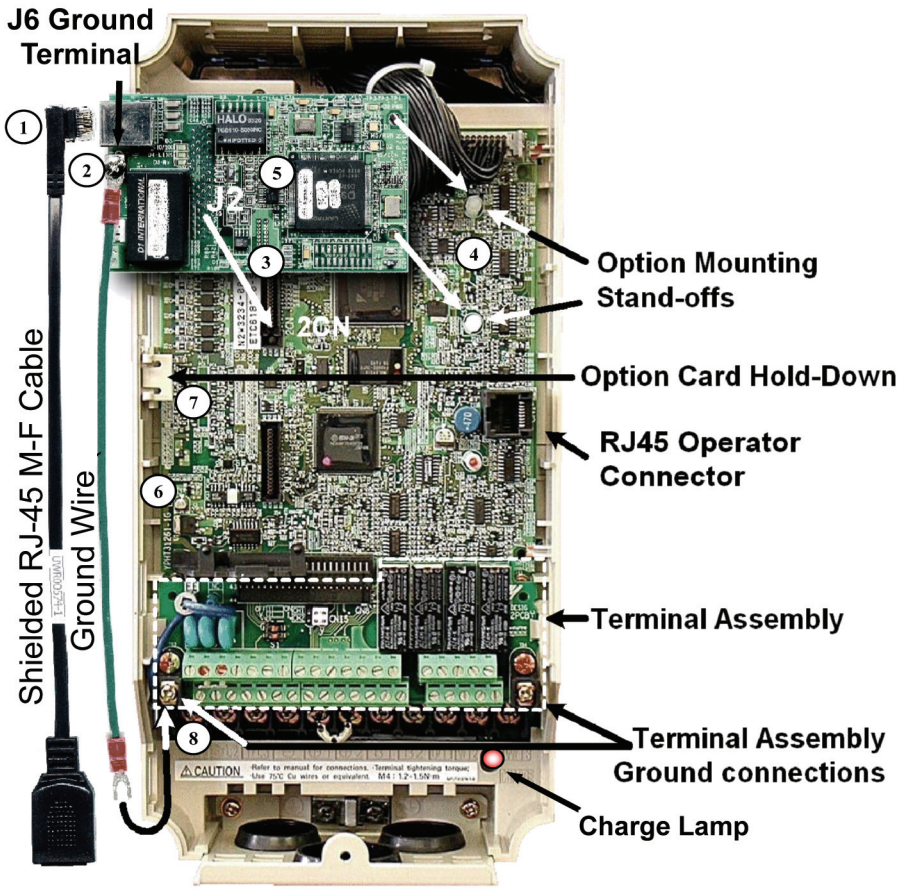


Fig 1.2 – Install the CM092 on an F7U Drive

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EtherNet/IP Option Card

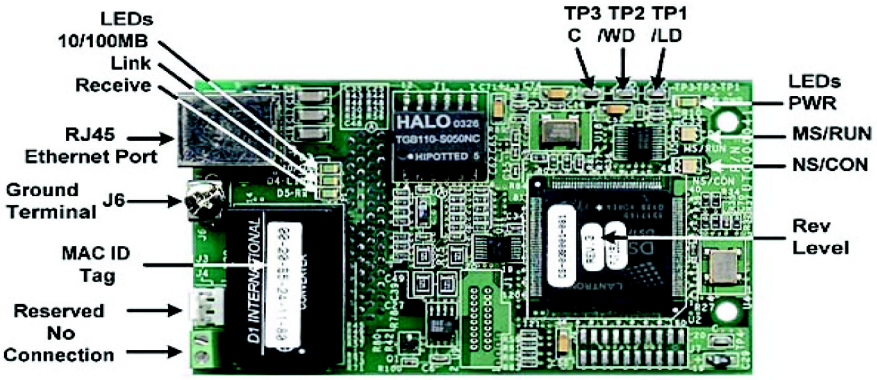

Fig 1.3 – CM092 Option Card Details

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◆ Diagnostic LED Power-up Sequence

A power-up test is performed each time the AC drive is powered-up after the initial boot-up sequence. The initial boot-up sequence may take several seconds. When this sequence is complete, the LEDs will assume their normal conditions.

Table 1.2 – LED Power-up Sequence

Seq	MS/RUN	NS/CON	Time
1	GREEN	OFF	250ms
2	RED	OFF	250ms
3	GREEN	OFF	250ms
4	GREEN	GREEN	250ms
5	GREEN	RED	250ms
6	GREEN	OFF	

The *EtherNet/IP Option Card* is successfully initialized after the LEDs have completed the above sequence.

The *EtherNet/IP Option Card* LED status after the power-up sequence is described below. Please wait for at least five seconds for the loading process to complete before verifying the status of the LEDs.

◆ Successful Initialization

The *EtherNet/IP Option Card* hardware is installed and operating correctly with the LEDs in the states shown in **bold text** in the "LED Descriptions" table below. The LINK LED represents the status of the physical connection to the network and is not indicative of any card state.

◆ LED Description

Table 1.3 – LED States		
LED	**Label**	**Description**
D1	MS/RUN	**GREEN – Card Functioning Normally** REEN BLINK – Standby/Initializing (500ms cycle) RED BLINK – Minor Fault (500ms cycle) RED – Major Fault GREEN/RED BLINK – Module Test (500ms cycle)
D2	NS/CON	**GREEN – Connected** **GREEN BLINK – Waiting for Connections (500ms cycle)** RED BLINK – Connection Timeout (500ms cycle) RED – Duplicate IP Address GREEN/RED BLINK – Network Test (500ms cycle)
D3	10/100	GREEN – 100Mbs Connection Speed
D4	LINK	**GREEN – Link Established**
D5	Rx	GREEN – Message Being Received
D8	PWR	**GREEN - Appropriate Power Supplied to Card**

◆ EtherNet/IP Option Card LED States

Table 1.4 - EtherNet/IP Option Card LED States			
LED	**Indicator**	**Behavior**	**Description**
MS/RUN	Steady OFF	No Power	No power is applied to the option card the LED remains OFF.
	Green Steady	Normal Operation	The option card is operating correctly with all initialization checks complete.
	Green Flash	Standby / Initializing	The option card is in process of configuring or waiting for configuration information.
	Red Flash	Minor Fault	The option card has detected a recoverable minor fault, such as incomplete configuration. Faults that are typically corrected by cycling power to the drive.
	Red Steady	Major Fault	The option card has detected a non-recoverable major fault, (Ram Error, corrupt storage, non - unique MAC address). All major faults will require more intervention than a power cycle to correct.
	Green/Red Flash	Option Card Test	Power-up sequence and tests.
NS/CON	OFF Steady	No Power or IP Address	The option card is powered OFF, or is not configured with an IP address and therefore cannot communicate on the network.
	Green Steady	Connected	The option card currently has one or more connections established to it.
	Green Flash	No Connections	The option card currently has no valid connections, but is correctly configured. The state is “waiting” for communication to assume.
	Red Flash	Connection Timeout	One or more of the established connections has timed out. The state will remain until all time-out connections have been re-established or a reset occurs. Recoverable minor fault
	Red Steady	Duplicate IP	A duplicate IP address has been discovered on the network or non-recoverable major network fault has occurred.
	Green/Red Flash	Network Test	Power-up sequence and tests.
10/100	OFF	10Mbps Connection	The network is operating at 10Mbps.
	Green	100Mbps Connection	The network is operating at 100Mbps.
Link	OFF	No Network Connection	The option card is not physically connected to the network. Check cable connections.
	Green	Network Connection	The option card is connected to a network.
Rx	OFF	No Message Received	No message to the option card is being received.
	Green	Message Received	A message to the option card is being received.
PWR	OFF	No Power	The drive is not powered or the option card is not securely connected to the drive.
	Green	Power Supplied	The option card has the appropriate power supplied.

Network and Web Access Configuration

◆ Connect to the EtherNet/IP Option Card

Note: Due to the presence of high voltage in the area of the network connection, insulating the RJ-45 M-F cable connection is required.

1. Prior to connecting the RJ-45 M-F network cable, slide the supplied insulated tubing (4"x1") over the female end of the supplied RJ-45 M-F cable.
   1.1 **Direct connection:** To connect directly to the *EtherNet/IP Option Card*, plug one end of a CAT-5 EtherNet/IP crossover cable into the RJ-45 socket on the supplied RJ-45 M-F cable. Connect the other end to the RJ-45 EtherNet/IP socket on the configuration device, typically a controller, laptop or other PC.
   1.2 **Connection through hub or switch:** To connect through a switch, hub or router, connect the RJ-45 socket on the RJ-45 M-F cable to the switch, hub or router using a standard CAT-5 patch cable.
2. After the network connection is made, slide the insulated tubing (4"x1") over the connection and secure it in place using the supplied cable ties.

◆ Configure the EtherNet/IP Network

1. The default configuration option for the *EtherNet/IP Option Card* is DHCP (Dynamic Host Configuration Protocol). Thus there must be a DHCP Server connected to the network in order to have the IP address of the *EtherNet/IP Option Card* set. For detailed information on how to setup the Rockwell BOOTP/DHCP Server on a PC refer to the appropriate Rockwell document or Yaskawa's Application Note AN.AFD.10.
2. If the network configuration requires that devices have a static IP address, the *EtherNet/IP Option Card's* configuration can be changed to USER and the appropriate static IP address can be entered via the *EtherNet/IP Option Card's* web pages as shown below.

Note that the *EtherNet/IP Option Card* must first have been assigned an IP address via DHCP before its configuration can be changed.

◆ Accessing the EtherNet/IP Option Card's Web Pages

The browser interface to the *EtherNet/IP Option Card* can be used for configuring the card or for network and drive information and diagnostics. To access the web pages:

1. Obtain the IP address of the desired drive and enter that IP address in the browser address bar. Hit Enter. The IP address of the desired drive is 192.168.1.20 in this example.
2. The main web page should be displayed.

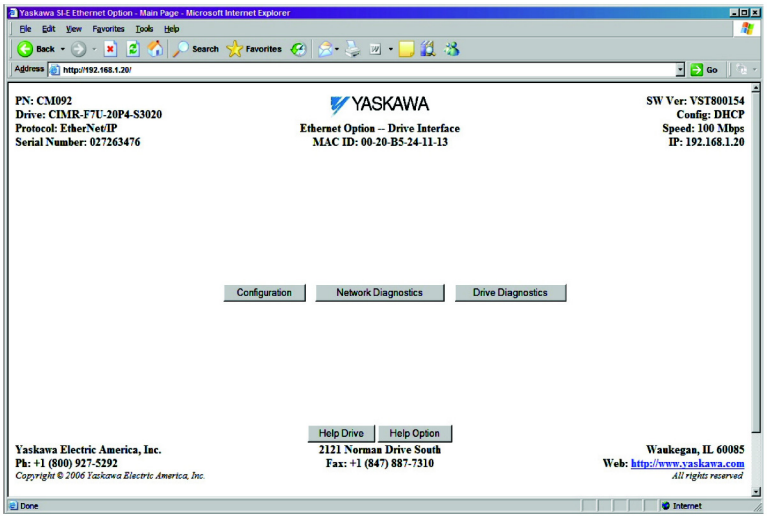

Fig 1.4 – CM092 Main Web Page

◆ Configuring a PC with a Static IP Address

1. Select an existing connection or create a new network connection for communication with the *EtherNet/IP Option Card*.
   1.1 Select **Start** ==> **Settings** ==> **Network** Connections from the task bar in the Windows OS.
   1.2 Select the network connection to be used.
2. Right click on the network connection and select **Properties** from the drop down menu.
3. Select **Internet Protocol (TCP/IP)** from the components displayed.

   Note: If a TCP/IP selection is not available, it may be installed by selecting Install. Administrator access to the PC and the OS operating system installation CD-ROMs may also be required.

   3.1 **Select** Properties.

   Note: If the PC is on a building or office network, disconnect it from that network before proceeding. Record the existing network settings. If the network connection already has an IP address assigned on the EtherNet/IP Local network, ignore the following instructions and just click on Cancel.

   3.2 **Select the** Use the following IP address **radio button**.
   3.3 Enter the IP address of a vacant IP address on the EtherNet/IP Local Network (192.168.1.19 in this example).
   3.4 Enter the subnet mask for the EtherNet/IP Local Network (255.255.255.0 **in this example**).
   3.5 Check the system network schematic or with your network administrator to ensure that the IP address does not already exist on the network.
   3.6 Once the **IP address** and **Subnet mask** are entered, select OK.

Note: It may be necessary to reboot the PC in order for the changes to take effect.

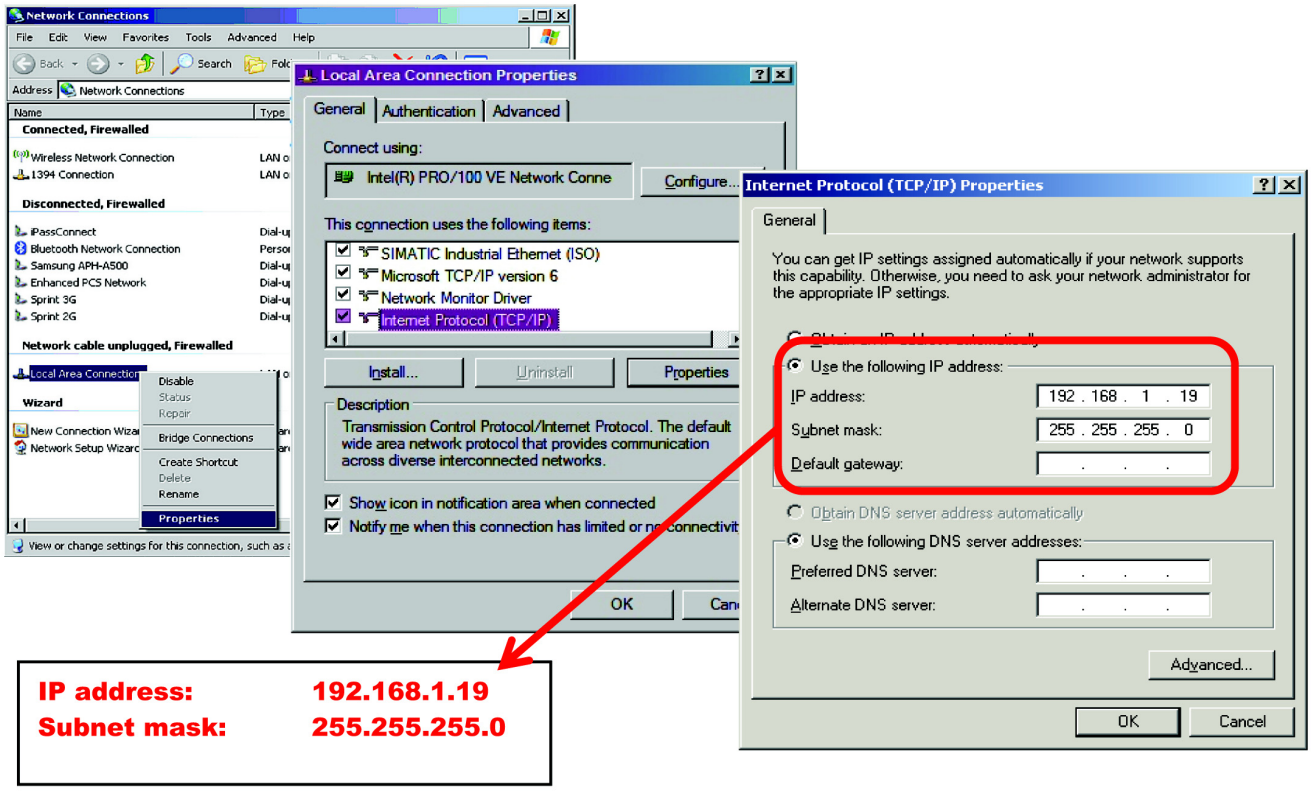
Network Connections
Local Area Connection Properties
General
Authentication
Advanced
Connect using:
Intel(R) PRO/100 VE Network Conne
Configure...
This connection uses the following items:
SIMATIC Industrial Ethernet (ISO)
Microsoft TCP/IP version 6
Network Monitor Driver
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
Notify me when this connection has limited or no connectivit
OK
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Use the following IP address:
IP address: 192 . 168 . 1 . 19
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel
IP address: 192.168.1.19
Subnet mask: 255.255.255.0

Fig 1.5 – PC Network Settings

◆ Configuring the EtherNet/IP Option Card

1. Select Configuration from the main web page.
2. After the **Configuration** page has been displayed, select the method in which the *EtherNet/IP Option Card* will obtain its IP address.
   - 2.1 User: The *EtherNet/IP Option Card* will use the network address as entered in the **IP**, **Subnet** and **Gateway** fields. Check with the system schematic or network administrator to insure that the IP address is valid and unique and that the subnet mask is correct.
     - 2.1.1 The **USER** radio button is used in this example.
     - 2.1.2 Enter the new IP address, 192.168.1.37 in this example.
   - 2.2 DHCP: The *EtherNet/IP Option Card* will use the network address assigned to it by the DHCP server.
   - 2.3 BOOTP: The *EtherNet/IP Option Card* will use the network address assigned to it by the BOOTP server.
3. Select the **Gateway Usage**. Connectivity to the *EtherNet/IP Option Card* may be limited or nonfunctional if the gateway usage setting and gateway address do not match the network infrastructure in which it is installed.
   - 3.1 **Do not use default gateway in system**. Select this radio button to disable the gateway when there is no external gateway in the system.
   - 3.2 **Do not use default gateway in system**. Select this radio button to disable the gateway when there is no external gateway in the system.
   - 3.3 In all cases the **Gateway** field must contain a valid IP address and must not be blank.
4. When the new configuration, IP address and subnet mask have been entered, click the **Submit** button.
5. Verify that the information is correct on the **Submit Results** page.
6. Power cycle the drive in order to store the new information on the *EtherNet/IP Option Card*.

Note: The IP address in the browser address bar will have to be changed to the drive's new IP address and the web page refreshed in order to continue to communicate with the *EtherNet/IP Option Card* web pages.

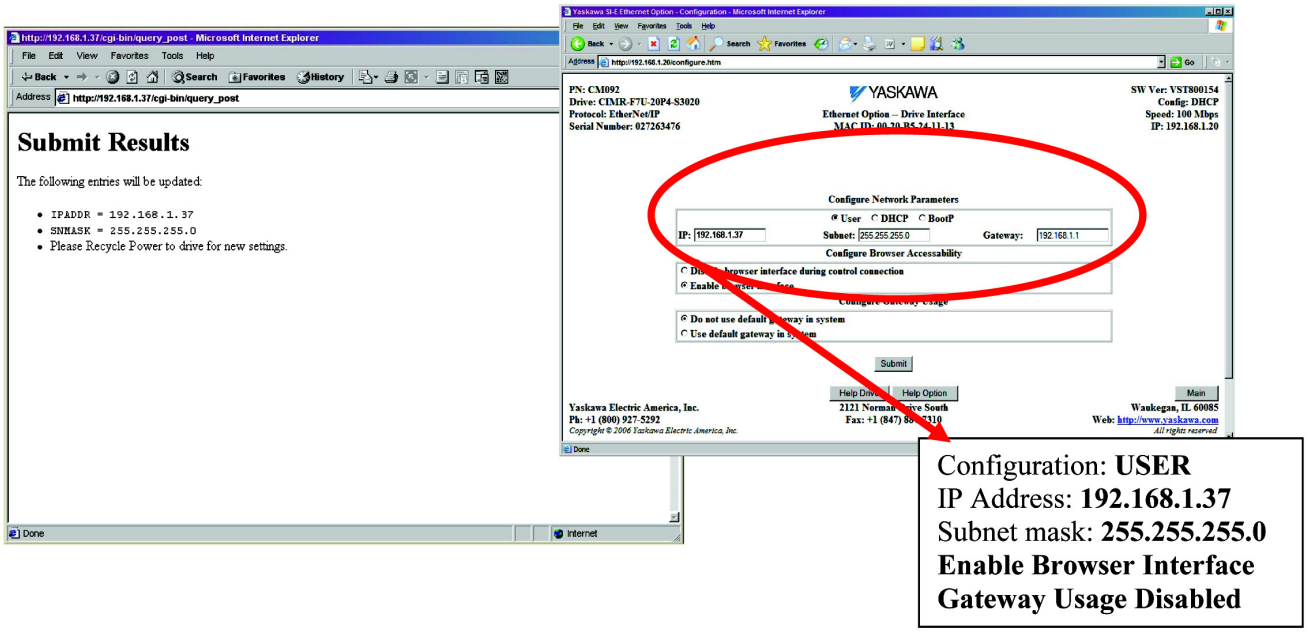

Fig 1.6 – CM092 Option Web Configuration

◆ Finish the EtherNet/IP Option Card Installation

1. Remove power from the AC drive and wait for the charge lamp to be completely extinguished. Wait at least five additional minutes for the drive to be completely discharged. Measure the AC drive DC bus voltage and verify that it is at a safe level.

> ⚠ **WARNING!**
> Dangerous voltages in excess of 400VDC (230V drives) or 800VDC (460V drives) are present at the DC bus terminals of the drive.

2. Reinstall all drive covers and the operator keypad. Apply power to the drive.
3. Set parameters b1-01 and b1-02 to their appropriate values.
4. Refer to the table below for available b1-01 and b1-02 values.

Table 1.4 – Run and Reference Source Selection

Parameter	Function	Data	Description	Default
b1-01	Reference Source	0	Digital Operator	1
		1	Terminal Strip	
		2	Built-in Modbus RTU RS-485 Terminals	
		3	**Option Kit** ***(EtherNet/IP Option)***	
		4	Pulse Input (F7 and G7 Only)	
b1-02	Run Source	0	Digital Operator	1
		1	Terminal Strip	
		2	Built-in Modbus RTU RS-485 Terminals	
		3	**Option Kit** ***(EtherNet/IP Option)***	

Important Notes

1. It is strongly recommended that shielded CAT-5 cable be used for all network cables.
2. Switches implementing IGMP snooping are strongly recommended. When IGMP snooping is used, devices will only receive the multi-cast packets in which they are interested.
3. The maximum number of simultaneous connections is: 1 for I/O, 4 for Explicit, 2 for DriveWizard.
4. Place the supplied MAC ID label on the side of the drive either above or below the drive nameplate.

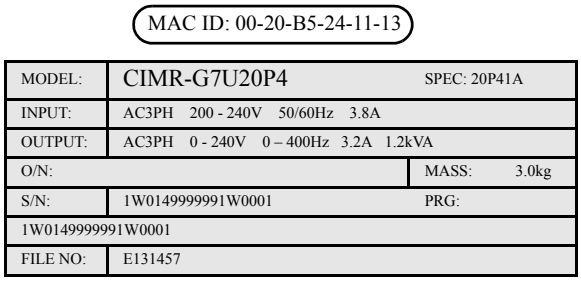

Fig 1.7 – Placing the MAC ID Label

5. To simplify the drive configuration, obtain EDS files at www.yaskawa.com. From the Yaskawa web site, select **Downloads** => **By Inverter Drives** => **By Product** => **Network Comms-Ethernet**. Then select the appropriate EDS file based on drive series and the latest version of those listed. EDS files for individual drive models are compressed into a single Zip file. Unzip these files into a temporary directory for installation. For example: The current file containing the G7U EDS files is named **EDS_G7U_UTC000068_V1_01.zip**. To extract the EDS file for model 20P4, extract the EDS file named *G7U20P4_UTC000068_V1_0*.eds*.

Refer to the appropriate user, programming or parameter access manual for a complete list of drive parameters and registers available. A list of applicable manuals is available at the beginning of this document.

Resetting the EtherNet/IP Option Card to its Default

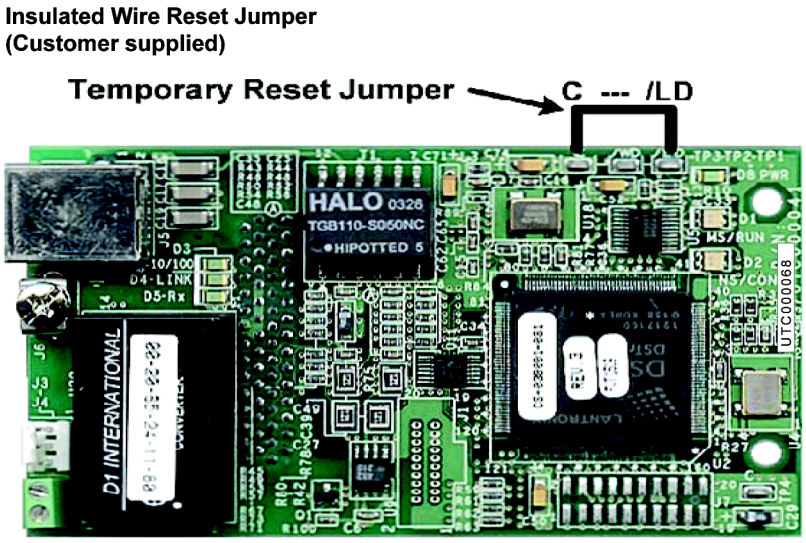

Fig 1.8 – CM092 Option Description

The factory default settings are as follows:

Configure Network Parameters:	DHCP
IP Address:	192.168.1.20
Subnet:	255.255.255.0
Gateway:	192.168.1.1

Symptom: The Yaskawa *EtherNet/IP Option Card* main web page does not display on the PC web browser screen.

Corrective Action: Check that the PC is setup, properly connected and that an IP address has been assigned to both the server and the node and that they are on the same local network.

If the web page is still not visible after confirming PC set up, then reset the configuration of the *EtherNet/IP Option Card* to its factory default as follows:

1. Remove power from the AC drive and wait for the charge lamp to be completely extinguished. Wait at least five additional minutes for the drive to be completely discharged. Measure the AC drive DC bus voltage and verify that it is at a safe level.
2. Place an insulated wire reset jumper between test points C and /LD on the *EtherNet/IP Option Card* as shown in the figure to the right.
3. Reapply power to the AC drive and wait approximately 10 seconds for the power-up cycle to complete.

> **WARNING!**
> Dangerous voltages in excess of 400VDC (230V drives) or 800VDC (460V drives) are present at the DC bus terminals of the drive.

4. Remove power from the AC drive and remove the jumper between C and /LD on the *EtherNet/IP Option Card*.
5. Reapply power to the AC drive and wait approximately 10 seconds for the power-up sequence to complete.

Drive Fault Messages

The table of *EtherNet/IP Option Card* fault codes returned by the drive is shown below. Refer to the appropriate drive user and/or programming manual(s) for drive specific information on the fault returned.

Table 1.5 – Fault Code Conversions

Drive Fault Code [hex]	*EtherNet/IP* Fault Code [hex]	Description	Drive Fault Code [hex]	*EtherNet/IP* Fault Code [hex]	Description
0h	0000h	None	16h	9000h	External Fault 8 (EF8)
1h	5120h	DC Bus Fuse Open (PUF)	18h	7310h	Overspeed Detection (OS)
2h	3220h	DC Bus Undervoltage (UV1)	19h	7310h	Speed Deviation (DEV)
3h	5110h	CTL PS Undervoltage (UV2)	1Ah	7301h	PG Open (PGO)
4h	3222h	MC Answerback (UV3)	1Bh	3130h	Input Phase Loss (PF)
5h	2130h	Short Circuit (SC)	1Ch	3130h	Output Phase Loss (LF)
6h	2120h	Ground Fault (GF)	1Eh	5300h	Operator Disconnected (OPR)
7h	2300h	Overcurrent (OC)	1Eh	5300h	OPE Faults
8h	3210h	DC Bus Overvoltage (OV)	1Fh	6320h	EEPROM R/W Error (ERR)
9h	4200h	Heatsink Over-temperature (OH)	21h	7500h	*EtherNet/IP* Communication Error (BUS)
0Ah	4210h	Heatsink Maximum Temperature (OH1)	22h	7500h	SI-E Communications Error
0Bh	2220h	Motor Overload (OL1)	23h	7500h	SI-F/G Communications Error
0Ch	2200h	Inverter Overload (OL2)	24h	7500h	SI-F/G CPU error
0Dh	2221h	Overtorque Detection 1 (OL3)	25h	8321h	Out of Control (CF)
0Eh	2222h	Overtorque Detection 2 (OL4)	26h	8313h	Zero Servo Fault (SVE)
0Fh	7110h	Dynamic Braking Transistor (RR)	27h	9000h	External Fault 0 (EF0)
10h	7112h	Dynamic Braking Resistor (RH)	28h	2310h	High Slip Braking (OL7)
11h	9000h	External Fault 3 (EF3)	29h	8321h	Undertorque Detection 1 (UL3)
12h	9000h	External Fault 4 (EF4)	2Ah	8321h	Undertorque Detection 2 (UL4)
13h	9000h	External Fault 5 (EF5)	2Bh	8110h	Feedback Loss (FBL)
14h	9000h	External Fault 6 (EF6)	2Ch	4300h	Motor Overheat 1 (OH3)
15h	9000h	External Fault 7 (EF7)	2Dh	4310h	Motor Overheat 2 (OH4)

◆ Drive Fault Operator Messages

The following is a table of faults that could be caused by the *EtherNet/IP Option Card* that will be displayed on the Operator Keypad only. For any fault displayed on the operator that is not listed in the following table, please see the appropriate drive technical manual.

Table 1.6 – Drive Faults (Displayed on the Drive Keypad)

Fault	Content	Cause	Solution
BUS	*EtherNet/IP Option Card* communications error	Communication is not established between EtherNet/IP Master and the drive.	• Check *EtherNet/IP Option Card* communication LED display.
EF0	*EtherNet/IP Option Card* external fault	Drive received an external fault command from the *EtherNet/IP Option Card*	• Check multi-function input settings • Check PLC or controller program • Eliminate cause of fault (machine device in fault state)
OPE05	Command selection fault	Parameter b1-01 is set to *EtherNet/IP Option Card* and no card is detected	• Install *EtherNet/IP Option Card* • Reprogram b1-01 • Replace the *EtherNet/IP Option Card*
OPE06	Reference selection fault	Parameter b1-02 is set to *EtherNet/IP Option Card* and no card is detected	• Install *EtherNet/IP Option Card* • Reprogram b1-02 • Replace the *EtherNet/IP Option Card*
CPF20	*EtherNet/IP Option Card* fault	Faulty J1/2CN connection	• Power cycle the drive • Reseat the *EtherNet/IP Option Card* • Replace the *EtherNet/IP Option Card* • Replace the inverter
CPF21	*EtherNet/IP Option Card* self-diagnostics fault	Faulty *EtherNet/IP Option Card*	• Replace the *EtherNet/IP Option Card*
CPF22	*EtherNet/IP Option Card* ID code fault		
CPF23	Watch dog timer fault		

Notes

Chapter 2 Browser Interface

This section describes the web server or browser interface to the EtherNet/IP Option Card.

Main Web Page 2-2

Configuration Web Page 2-3

Submit Page 2-4

Network Diagnostics Web Page 2-5

Drive Diagnostics Web Page 2-6

Main Web Page

The main page is the first web page displayed. It displays the standard page header and footer along with links to the other web pages.

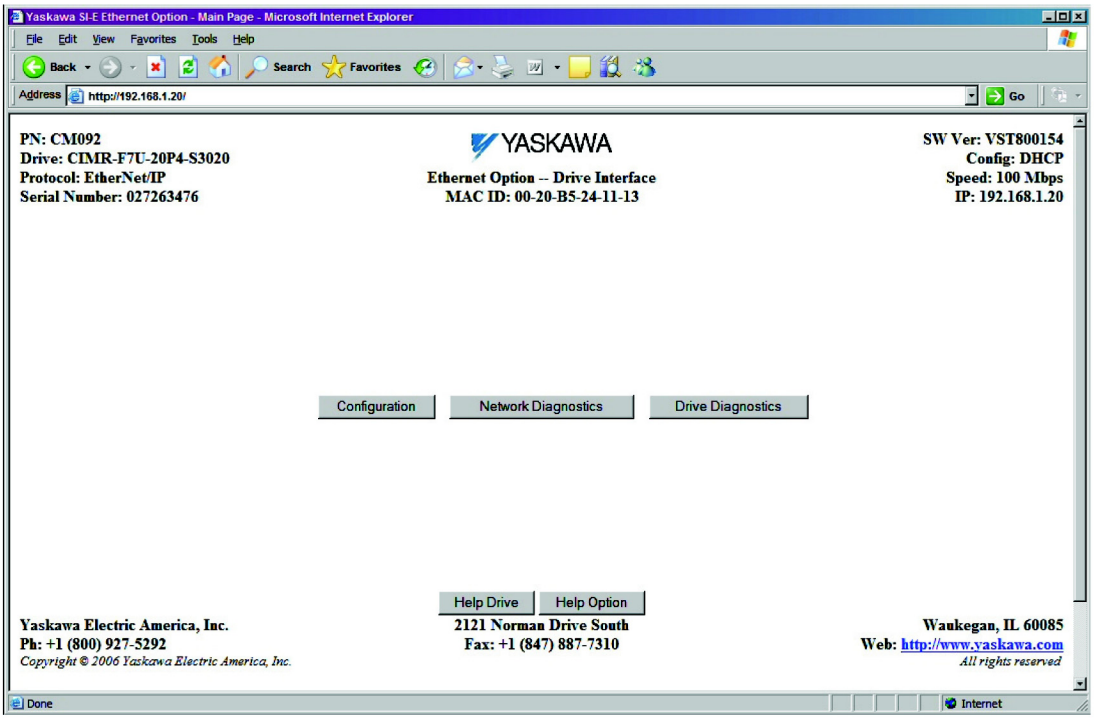

Fig 2.1 – *EtherNet/IP Option Card* Main Web Page

◆ Standard Header

The standard heading displays information specific to the installed *EtherNet/IP Option Card*.

- **PN:** Part Number: Indicates the part number for the *EtherNet/IP Option Card*.
- **Drive Model and Software:** Indicates the drive family and model along with the dive control card software version. The software control card software version is represented by the last 4 digits preceded by '-S".
- **Protocol Name:** Indicates the current protocol supported - EtherNet/IP.
- **Serial Number:** Indicates the serial number of this particular *EtherNet/IP Option Card*. Each card has a unique serial number.
- **MAC ID:** The MAC ID is unique to each *EtherNet/IP Option Card*.
- Option Software Version/Revision: The first five (5) digits following "VST" represent the main *EtherNet/IP Option Card* software version. The last digit represents the current revision level.
- **Config:** Server Configuration: Determines how and where the IP address is generated.
- **Speed:** Connection Speed: Current connection speed. Either 10 or 100 will be displayed.
- **IP Address:** The IP address of the current *EtherNet/IP Option Card*.

◆ Standard Footer

The standard footer contains information on how to contact Yaskawa for technical support.

Configuration Web Page

The configuration page contains the standard header and footer along with a method of configuring the EtherNet/IP server and web server interfaces of the *EtherNet/IP Option Card*.

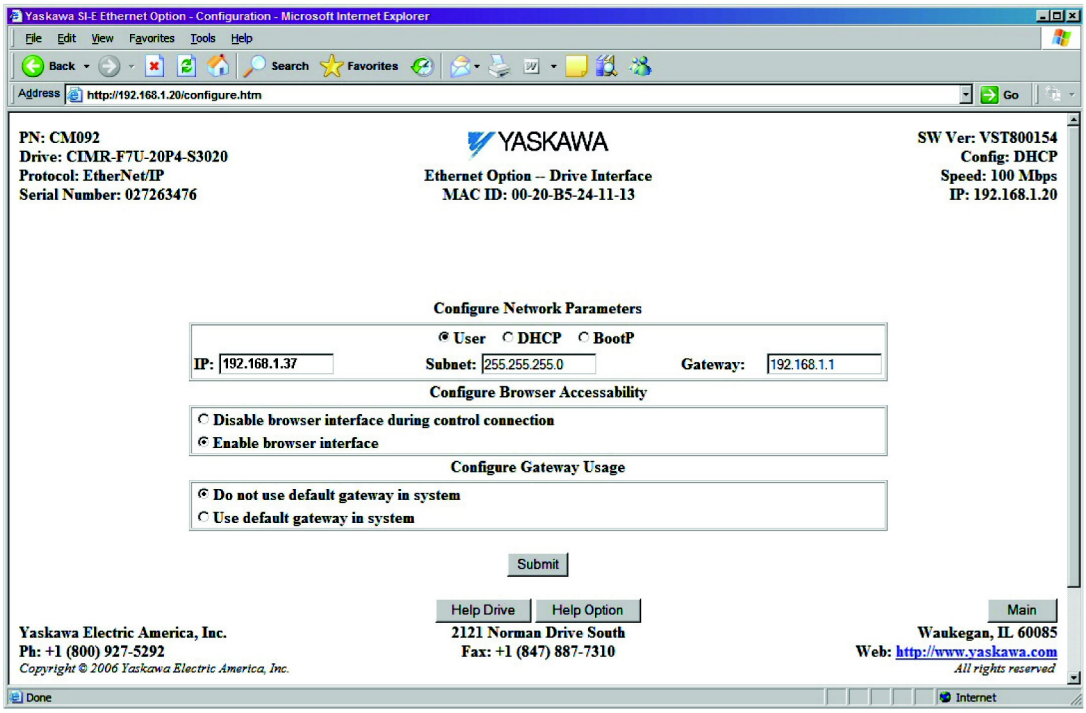

Fig 2.2 – Configuration Web Page

◆ Web Server Configuration

The web server configuration allows for the setting of the IP Address, Subnet Mask, Gateway and EtherNet/IP server type. All octets must contain valid numbers between 0 and 255. The **Submit** button must be pressed, the accepted page displayed and the drive power cycled before any changes are effective.

- Configure Network Parameters.
  - **IP:** A series of four (4) octets separated by **"."** that determines the interface address for the current *EtherNet/IP Option Card*.
  - **SubNet:** A series of four (4) octets separated by **"."** that determines the *local area network for the EtherNet/IP Option Card*.
  - **Gateway:** A series of four (4) octets separated by **"."** that determines the IP Address of the gateway server. If a gateway server is not used, select ***Do not use default gateway in system***. The gateway field must contain a valid IP address whether it is used or not and must not be blank.
  - Address Configuration Mode:

    USER: The user enters The IP address via the web interface.
    DHCP: The IP Address is set by a DHCP server and not by the user via the web interface.
    BootP: The IP Address is set by a BootP server and not by the user via the web interface.
    Note: Verify that a DHCP or BootP server determines the network address before selecting either.
  - **Browser Access Configuration:** In order to view the web pages, ***Enable browser interface*** must be selected.

Submit Page

After any of the configuration parameters shown above have been changed, the submit button must be pressed to store the changed data. The drive must then be power cycled for the new data to take affect. Verify that the data on the submit page is correct.

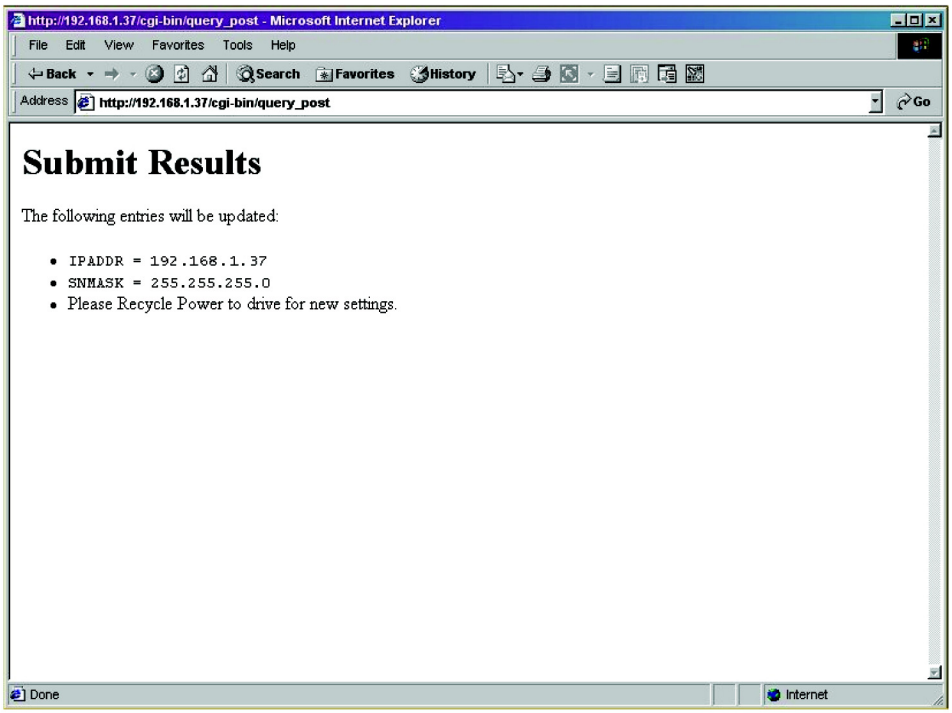

Fig 2.3 – Submit page

After the data on the submit page has been verified and the drive power cycled, make sure to reset your network parameters and browser address accordingly.

Network Diagnostics Web Page

The network diagnostics page displays the standard header and footer along with information relative to network and *EtherNet/IP Option Card* performance.

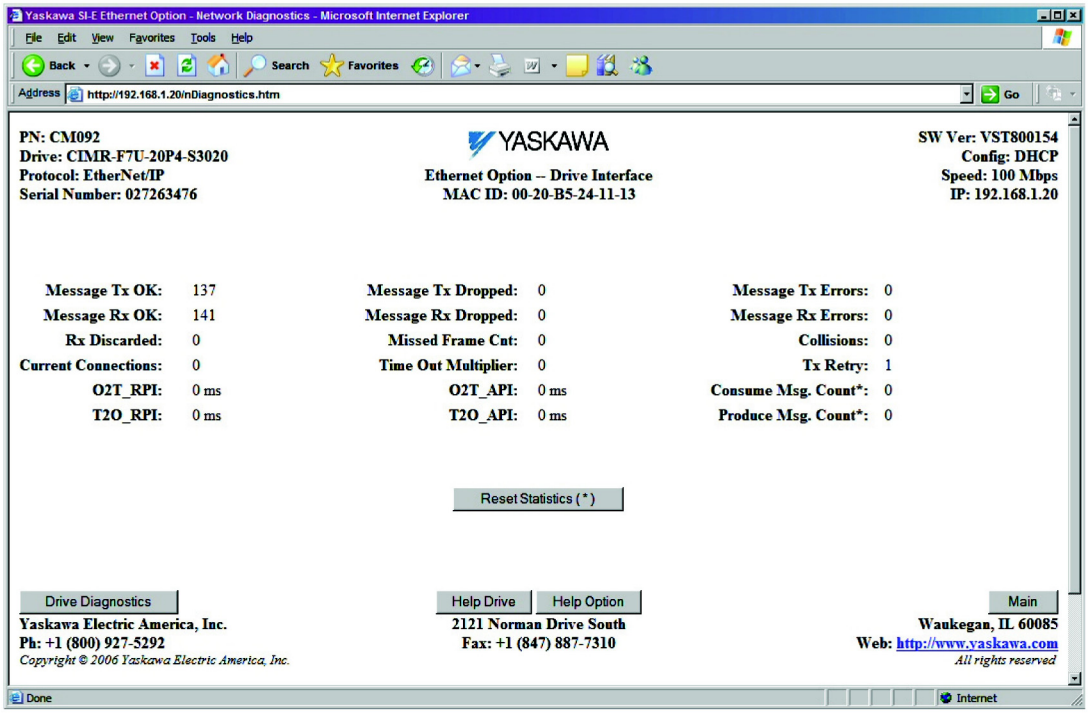

Fig 2.4 – Network Diagnostics Web Page

- Message Tx OK: Transmit Message Count: The number of messages sent from the *EtherNet/IP Option Card*.
- Message Rx OK: Receive Message Count: The number of messages received by the *EtherNet/IP Option Card*.
- Rx Discarded: Received Messages Discarded: The number of received messages discarded by the *EtherNet/IP Option Card*.
- Current Connections: The number of established connections used on the *EtherNet/IP Option Card*.
- O2T RPI: The time interval for Master to Slave messaging during I/O connection (mS).
- T2O RPI: The time interval for Slave to Master messaging during I/O connection (mS).
- Message Tx Dropped: Dropped Transmit Messages: The number of dropped transmit messages sensed on the *EtherNet/IP Option Card*.
- Message Rx Dropped: Dropped Receive Messages: The number of dropped receive messages sensed on the *EtherNet/IP Option Card*.
- Missed Frame Cnt: The number of missed frame errors sensed on the *EtherNet/IP Option Card*.
- Time Out Multi: The current timeout multiplier for I/O messages received from the master controller, during the I/O connection.
- O2T API: The time interval for Master to slave setup messaging during I/O connection (mS).
- T2O API: The time interval for Slave to Master setup messaging during I/O connection (mS).
- Message Tx Errors: Transmit Message Errors: The number of error messages sent from the *EtherNet/IP Option Card* due to not processing or incorrect processing.
- Message Rx Errors: Receive Message Errors: The number of error messages received on the *EtherNet/IP Option Card* due to not processing or incorrect processing.
- Collisions: The number of collisions sensed on the *EtherNet/IP Option Card*.
- Tx Retry: Transmit Retries: The number of transmit retries on the *EtherNet/IP Option Card* due to media collisions or non granted access to the media.
- Consumed Message Cnt: The number of consumed messages.
- Produced Message Cnt: The number of produced messages.
- Reset Statistics Button: Reset counters.

Drive Diagnostics Web Page

The drive diagnostics page contains the standard header and footer along with diagnostic information specific to the current drive.

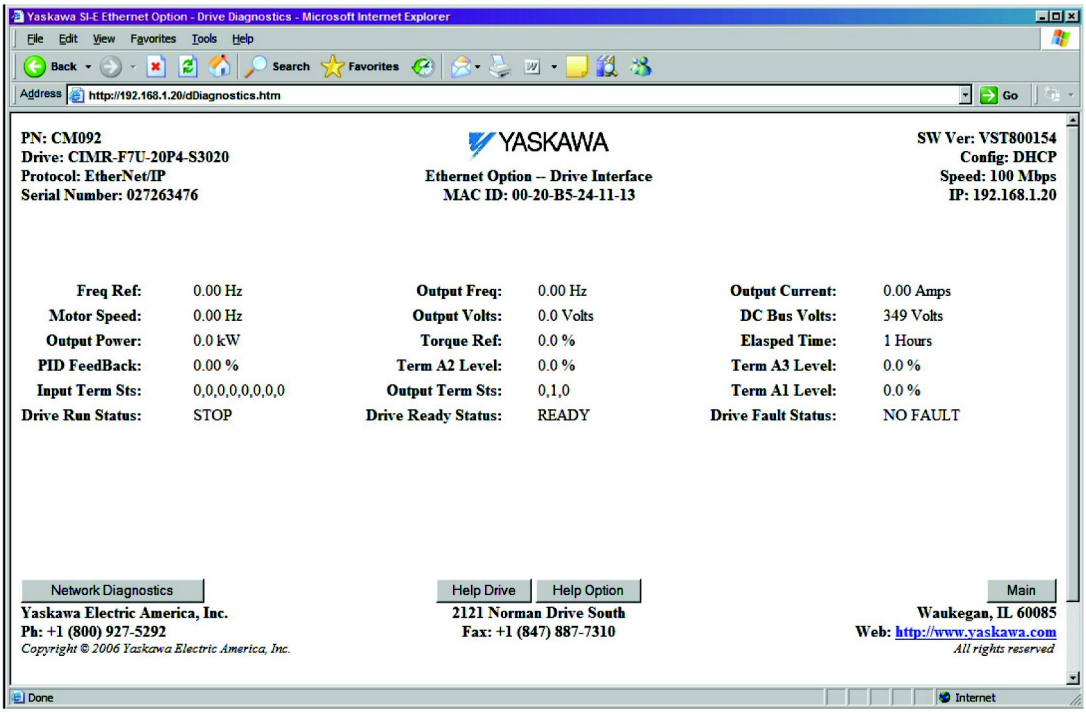

Fig 2.5 – Drive Diagnostics Web Page

- Freq Ref: Frequency Reference – Monitor Parameter U1-01.
- Motor Speed: Motor Speed – Monitor Parameter U1-05.
- Output Power: Output Power – Monitor Parameter U1-08.
- PID Feedback: PID Feedback in %.
- Input Terminal Sts: The Digital Input status as bit field – Monitor Parameter U1-10.
- Drive Run Status: Indicates RUN/STOP state of the drive.
- Output Freq: Output Frequency – Monitor Parameter U1-02.
- Output Volts: Output Voltage – Monitor Parameter U1-06.
- Torque Ref: Torque Reference - Monitor Parameter U1-09.
- Term A2 Level: The analog input A1 Terminal A2 (14) monitor value U1-16.
- Output Terminal Sts: Digital Output status as bit field – Monitor Parameter U1-11.
- Drive Ready Status: Indicates the drive READY status.
- Output Current: Output Current – Monitor Parameter U1-03.
- DC Bus Volts: DC bus Voltage – Monitor Parameter U1-07.
- Elapsed Time: Elapsed Time – Monitor Parameter U1-13.
- Term A3 Level: The analog input Terminal A3 (16) monitor value U1-17.
- Term A1 Level: The analog input Terminal A1 monitor value U1-15.
- Drive Fault Status: Indicates drive FAULT status.

Chapter 3 EtherNet/IP Objects

This section describes the EtherNet/IP Option Card supported objects.

In the following tables G5M represents the G5M (F Spec), G5(600V) and G5M(HHP) drives.

Supported Output Instances 3-2

Yaskawa Output Instances 3-4

Supported Input Instances 3-6

Yaskawa Input Instances 3-8

CIP Supported Objects 3-12

Yaskawa Supported Objects 3-19

Fault Code Conversions 3-23

Supported Output Instances

◆ Basic Speed Control Output Instance 20 (14h)

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	-	-	-	-	-	Fault Reset	-	Run Forward
20	1	-							
	2	Speed Reference (Low Byte) [scaled by parameter o1-03]							
	3	Speed Reference (High Byte) [scaled by parameter o1-03]							

Run Forward: Forward RUN Command

Fault Reset: Fault Reset Command

Speed reference: RPM when o1-03 = (2 ~ 39)

◆ Extended Speed Control Output Instance 21 (15h)

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	-	Net Reference	Net Control	-	-	Fault Reset	Run Reverse	Run Forward
21	1	-							
	2	Speed Reference (Low Byte) [scaled by parameter o1-03]							
	3	Speed Reference (High Byte) [scaled by parameter o1-03]							

Run Forward: Forward RUN Command

Run Reverse: Reverse RUN Command

Fault Reset: Fault Reset Command

Net Control: Parameter b1-02
0 - 1 transition sets b1-02 = 3
1 - 0 transition sets b1-02 to previous value

Net Reference: Parameter b1-01
0 - 1 transition sets b1-01 = 3
1 - 0 transition sets b1-01 to previous value

Speed Reference: RPM when o1-03 = (2 ~ 39)

◆ Speed and Torque Control Output Instance 22 (16h)

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	-	-	-	-	-	Fault Reset	-	Run Forward
22	1	-							
	2	Speed Reference[1] (Low Byte) [scaled by parameter o1-03]							
	3	Speed Reference[1] (High Byte) [scaled by parameter o1-03]							
	4	Torque Reference[2] (Low Byte) [0.1%]							
	5	Torque Reference[2] (High Byte) [0.1%]							

Note: [1] Becomes torque limit in torque mode
[2] F7U, G7U and G5M in FVC mode only

Run Forward: Forward RUN Command
Run Reverse: Reverse RUN Command
Fault Reset: Fault Reset Command
Speed Reference: RPM when o1-03 = (2 ~ 39)
Torque Reference: Percent of rated torque - (F7U, G7U and G5M Closed-loop flux vector mode (FVC) only)

◆ Extended Speed and Torque Control Output Instance 23 (17h)

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	-	Net Reference	Net Control	-	-	Fault Reset	Run Reverse	Run Forward
23	1	-							
	2	Speed Reference[1] (Low Byte) [scaled by parameter o1-03]							
	3	Speed Reference[1] (High Byte) [scaled by parameter o1-03]							
	4	Torque Reference[2] (Low Byte) [0.1%]							
	5	Torque Reference[2] (High Byte) [0.1%]							

Note: [1] Becomes torque limit in torque mode
[2] F7U, G7U and G5M in FVC mode only

Run Forward: Forward RUN Command
Run Reverse: Reverse RUN Command
Fault Reset: Fault Reset Command
Net Control: Parameter b1-02
0 - 1 transition sets b1-02 = 3
1 - 0 transition sets b1-02 to previous value
Net Reference: Parameter b1-01
0 - 1 transition sets b1-01 = 3
1 - 0 transition sets b1-01 to previous value
Speed Reference: RPM when o1-03 = (2 ~ 39)
Torque Reference: Percent of rated torque - (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)

Yaskawa Output Instances

◆ Yaskawa Standard Speed/Torque Control Output Instance 101 (65h)

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	Terminal S8	Terminal S7	Terminal S6	Terminal S5	Terminal S4	Terminal S3	Run Reverse	Run Forward
	1	Terminal P2	Terminal P1	Terminal M1-M2	-	-	-	Fault Reset	External Fault
101	2	Speed Reference[1] (Low Byte) [scaled by parameter o1-03]							
	3	Speed Reference[1] (High Byte) [scaled by parameter o1-03]							
	4	Torque Reference[2] (Low Byte) [0.1%]							
	5	Torque Reference[2] (High Byte) [0.1%]							
	6	Torque Compensation[2] (Low Byte) [0.1%]							
	7	Torque Compensation[2] (High Byte) [0.1%]							

Note: [1] Becomes torque limit in torque mode

[2] F7U, G7U and G5M in FVC mode only

Run Forward: Forward RUN Command

Run Reverse: Reverse RUN Command

Terminal S3: Multi-function Digital Input 1 (H1-01)

Terminal S4: Multi-function Digital Input 2 (H1-02)

Terminal S5: Multi-function Digital Input 3 (H1-03)

Terminal S6: Multi-function Digital Input 4 (H1-04)

Terminal S7: Multi-function Digital Input 5 (H1-05)

Terminal S8: Multi-function Digital Input 6 (H1-06) (F7U and G7U only)

External Fault: External Fault (Setting of H1-01 ~ H1-06)

Fault Reset: Fault Reset Command

Terminal M1-M2: Multi-function Digital Output 1 (H2-01)

Terminal P1: Multi-function Digital Output 2 (H2-02)

Terminal P2: Multi-function Digital Output 3 (H2-03) (F7U and G7U only)

Speed Reference: RPM when o1-03 = (2 ~ 39)

Torque Reference: Percent of rated torque - (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only))

Torque Compensation: Percent of rated torque - (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)

◆ Yaskawa Extended Speed/Torque Control Output Instance 115 (73h)

Output	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	Terminal S8	Terminal S7	Terminal S6	Terminal S5	Terminal S4	Terminal S3	Run Reverse	Run Forward
	1	Terminal P2	Terminal P1	Terminal M1-M2				Fault Reset	External Fault
115	2h	Speed Reference[1] (Low Byte) [scaled by parameter o1-03]							
	3h	Speed Reference[1] (High Byte) [scaled by parameter o1-03]							
	4h	Torque Reference[2] (Low Byte) [0.1%]							
	5h	Torque Reference[2] (High Byte) [0.1%]							
	6h	Torque Compensation[2] (Low Byte) [0.1%]							
	7h	Torque Compensation[2] (High Byte) [0.1%]							
	8h	Not Used							
	9h	Not Used							
	10 (0Ah)	Not Used							
	11 (0Bh)	Not Used							
	12 (0Ch)	Terminal A1 (Low Byte)							
	13 (0Dh)	Terminal A1 (High Byte)							
	14 (0Eh)	Terminal A2 (Low Byte)							
	15 (0Fh)	Terminal A2 (High Byte)							
	16 (10h)	Digital Output (Low Byte)							
	17 (11h)	Digital Output (High Byte)							
	18 (12h) – 39 (27h)	Not Used							

Note: [1] Becomes torque limit in torque mode
[2] F7U, G7U and G5M in FVC mode only

Run Forward: Forward RUN Command - the forward and reverse run commands cannot be issued simultaneously
Run Reverse: Reverse RUN Command - the forward and reverse run commands cannot be issued simultaneously
Terminal S3: Multi-function Digital Input 1 (H1-01)
Terminal S4: Multi-function Digital Input 2 (H1-02)
Terminal S5: Multi-function Digital Input 3 (H1-03)
Terminal S6: Multi-function Digital Input 4 (H1-04)
Terminal S7: Multi-function Digital Input 5 (H1-05)
Terminal S8: Multi-function Digital Input 6 (H1-06) (F7U and G7U only)
External Fault: External Fault (Setting of H1-01 ~ H1-06)
Fault Reset: Fault Reset Command
Terminal M1-M2: Multi-function Digital Output 1 (H2-01)
Terminal P1: Multi-function Digital Output 2 (H2-02)
Terminal P2: Multi-function Digital Output 3 (H2-03) (F7U and G7U only)
Speed Reference: RPM when o1-03 = (2 ~ 39)
Torque Reference: Percent of rated torque - (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)
Torque Compensation: Percent of rated torque - (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)
Terminal A1: Analog Input 1 (H3-04)
Terminal A2: Analog Input 2 (H3-08)
Digital Output: Digital Output as bit field

Supported Input Instances

◆ Basic Speed Control Input Instance 70 (46h)

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	-	-	-	-	-	Running 1 (FWD)	-	Faulted
70	1	-							
	2	Speed Actual (Low Byte) [scaled by parameter o1-03]							
	3	Speed Actual (High Byte) [scaled by parameter o1-03]							

Faulted: Drive Fault
Running 1 (Forward): Running in forward direction
Speed Actual: RPM if o1-03 = (2 ~ 39)

◆ Extended Speed Control Input Instance 71 (47h)

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	At Speed	Reference from Net	Control from Net	Ready	Running 2 (REV)	Running 1 (FWD)	Warning	Faulted
71	1	-							
	2	Speed Actual (Low Byte) [scaled by parameter o1-03]							
	3	Speed Actual (High Byte) [scaled by parameter o1-03]							

Faulted: Drive Fault
Warning: Drive Alarm
Running 1 (FWD): Running in forward direction
Running 1 (REV): Running in reverse direction
Ready: Drive Ready
Control from Net: 0 = Non-network control
1 = Control from network
Reference from Net: 0 = Reference not from network
1 = Reference from network
At Speed: Speed Agree
Speed Actual: RPM if o1-03 = (2 ~ 39)

◆ Speed and Torque Control Input Instance 72 (48h)

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	-	-	-	-	-	Running 1 (FWD)	-	Faulted
72	1	-							
	2	Speed Actual (Low Byte) [scaled by parameter o1-03							
	3	Speed Actual (High Byte) [scaled by parameter o1-03]							
	4	Torque Actual[1] (Low Byte) [0.1%]							
	5	Torque Actual[1] (High Byte) [0.1%]							

Note: [1] F7U, G7U and G5M in FVC mode only

Faulted: Drive Fault

Running 1 (Forward): Running in forward direction

Speed Actual: RPM if o1-03 = (2 ~ 39)

Torque Actual: Percent of rated torque

◆ Extended Speed and Torque Control Input Instance 73 (49h)

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	At Speed	Reference from Net	Control from Net	Ready	Running 2 (REV)	Running 1 (FWD)	Warning	Faulted
73	1	-							
	2	Speed Actual (Low Byte) [scaled by parameter o1-03							
	3	Speed Actual (High Byte) [scaled by parameter o1-03]							
	4	Torque Actual[1] (Low Byte) [0.1%]							
	5	Torque Actual[1] (High Byte) [0.1%]							

Note: [1] F7U, G7U and G5M in FVC mode only

Faulted: Drive Fault

Warning: Drive Alarm

Running 1 (Forward): Running in forward direction

Running 1 (Reverse): Running in reverse direction

Ready: Drive Ready

Control from Net: 0 = Non-network control

1 = Control from network

Reference from Net: 0 = Reference not from network

1 = Reference from network

At Speed: Speed Agree

Speed Actual: RPM if o1-03 = (2 ~ 39)

Torque Actual: Percent of rated torque

Yaskawa Input Instances

◆ Yaskawa Standard Speed/Torque Input Instance 151 (97h)

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	FAULT	ALARM	READY	Speed Agree	Reset	Running REV	ZSP	Running FWD
	1	ZSV	-	Terminal P2	Terminal P1	Terminal M1-M2	Local/ Remote	UV	OPE
151	2	Output Frequency (Low Byte) [scaled by parameter o1-03]							
	3	Output Frequency (High Byte) [scaled by parameter o1-03]							
	4	Torque Reference[1] (Low Byte) [0.1%]							
	5	Torque Reference[1] (High Byte) [0.1%]							
	6	Output Current (Low Byte) [0.1A or 0.01A]							
	7	Output Current (High Byte) [0.1A or 0.01A]							

Note: [1] F7U, G7U and G5M in FVC mode only

Running Forward: Running in the forward direction
ZSP: At Zero Speed
Running Reverse: Running in the reverse direction
Reset: Fault reset
Speed Agree: @ commanded speed
Ready: Drive Ready
Alarm: Drive Alarm
Fault: Drive Fault
OPE: Drive OPE Fault
UV: Drive Undervoltage Fault
Local/Remote: 0 = Drive is in Local Control
1 = Drive is in Remote Control
Terminal M1-M2: Multi-function Digital Output 1 (H2-01)
Terminal P1: Multi-function Digital Output 2 (H2-02)
Terminal P2: Multi-function Digital Output 3 (H2-03)
ZSV: Zero Servo (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)
Output Frequency: Output frequency of the drive
Torque Reference: Percent of rated torque
Output Current: Parameter o2-04 for kVA model - Scaling is 0.01A for kVA models 00h ~ 06h and 20h ~ 26h

◆ Yaskawa Extended Speed/Torque Input Instance 155 (9Bh)

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Instance	0	FAULT	ALARM	READY	Speed Agree	Reset	REV Running	ZSP	FWD Running
	1	ZSV		Terminal P2	Terminal P1	Terminal M1-M2	Local/ Remote	UV	OPE
155	2h	Output Speed (Low Byte) [scaled by parameter o1-03]				Monitor Parameter U1-05			
	3h	Output Speed (High Byte) [scaled by parameter o1-03]							
	4h	Torque Reference (Low Byte) [0.1%]				Monitor Parameter U1-09			
	5h	Torque Reference (High Byte) [0.1%]							
	6h	PG Count Value (PG-X2) (Low Byte)				Encoder pulse count from PG-X2 option when in flux vector mode. There is no associated drive parameter.			
	7h	PG Count Value (PG-X2) (High Byte)							
	8h	Frequency Command (Low Byte) [scaled by parameter o1-03]				Monitor Parameter U1-01			
	9h	Frequency Command (High Byte) [scaled by parameter o1-03]							
	10 (0A)	Output Frequency (Low Byte) [scaled by parameter o1-03]				Monitor Parameter U1-02			
	11 (0B)	Output Frequency (High Byte) [scaled by parameter o1-03]							
	12 (0C)	Output Current (Low Byte) [0.1A or 0.01A]				Monitor Parameter U1-03			
	13 (0D)	Output Current (High Byte) [0.1A or 0.01A]							
	14 (0E)	Inverter Terminal A2 Output (Low Byte)				Monitor Parameter U1-16 Terminal A2 (Terminal 14 for G5M)			
	15 (0F)	Inverter Terminal A2 Output (High Byte)							
	16 (10)	Main Circuit DC Voltage (Low Byte)				Monitor Parameter U1-07			
	17 (11)	Main Circuit DC Voltage (High Byte)							
	18 (12)	Error Alarm Signal 1 (Low Byte)				For details refer to the following section:			
	19 (13)	Error Alarm Signal 1 (High Byte)							
	20 (14)	Error Alarm Signal 2 (Low Byte)							
	21 (15)	Error Alarm Signal 2 (High Byte)							
	22 (16)	Error Alarm Signal 3 (Low Byte)							
	23 (17)	Error Alarm Signal 3 (High Byte)							
	24 (18)	Inverter Terminal A3 Input (Low Byte)				Monitor Parameter U1-17 Terminal A3 (Terminal 16 for G5)			
	25 (19)	Inverter Terminal A3 Input (High Byte)							
	26 (1A)	Inverter Terminals S1~S8 Input (Low Byte)				Monitor Parameter U1-10 P7U/E7U Terminals S1-S7 F7U/G7U Terminals S1-S8 G5M Terminals 1-8			
	27 (1B)	Inverter Terminals S1~S8 Input (High Byte)							
	28 (1C)	Inverter Terminal A1 Input (Low Byte)				Monitor Parameter U1-15 Terminal A1 (Terminal 13 for G5)			
	29 (1D)	Inverter Terminal A1 Input (High Byte)							
	30 (1E)	PG Counter (Ch2) (PG-W2) (Low Byte)				Encoder pulse count from PG-W2 option when in flux vector mode. Speed detection PG counter value.			
	31 (1F)	PG Counter (Ch2) (PG-W2) (High Byte)							
	32 (20h) – 39 (29h)	Not Used							

Running Forward: Running in the forward direction
ZSP: At Zero Speed
Running Reverse: Running in the reverse direction
Reset: Fault Reset
Speed Agree: @ Commanded Speed
Ready: Drive Ready
Alarm: Drive Alarm
Fault: Drive Fault

OPE:	Drive OPE Fault
UV:	Drive Undervoltage Fault
Local/Remote:	0 = Drive is in Local Control 1 = Drive is in Remote Control
Terminal M1-M2:	Multi-function Digital Output 1 (H2-01)
Terminal P1:	Multi-function Digital Output 2 (H2-02)
Terminal P2:	Multi-function Digital Output 3 (H2-03) (F7U and G7U only)
ZSV:	Zero Servo (F7U, G7U and G5M in Closed-loop flux vector mode (FVC)
Output Speed:	RPM if o1-03 = (2 ~ 39)
Torque Reference:	Percent of Rated torque
PG Count Value:	PG-X2 pulse count
Frequency Command:	Frequency command
Output Frequency:	Output frequency of the drive
Output Current:	Parameter o2-04 for kVA model - Scaling is 0.01A for kVA models 00h ~ 06h and 20h ~ 26h
Inverter Terminal A2 Input:	Analog Input 2 (Terminal 14 for the G5)
Main Circuit DC Voltage:	Monitor Parameter U1-07
Error Alarm Signal 1:	Refer to: (Details for bytes 10 through 23, Error
Error Alarm Signal 2	Alarm Signals 1, 2, and 3)
Error Alarm Signal 3:	
Inverter Terminal A3 Input:	Analog Input 3 (F7U and G7U only) (Terminal 16 for the G5)
Inverter Terminals S1~S8 Input:	Digital Inputs as bit field (Terminals S1-S7 for the P7U/E7U, Terminals 1-8 for the G5)
Inverter Terminal A1 Input:	Analog Input 1 (Terminal 13 for the G5)
PG Counter (Ch2):	Encoder pulse count from PG-W2 option

◆ Yaskawa Extended Speed/Torque Input Instance 155 (9Bh)

(Details for bytes 10 through 23, Error Alarm Signals 1, 2, and 3)

Bytes 18 (Low) and 19 (High) - Error Alarm Signal 1		**Bytes 20 (Low) and 21 (High) -** Error Alarm Signal 2		**Bytes 22 (Low) and 23 (High) -** Error Alarm Signal 3	
Bit	**Fault**	**Bit**	**Fault**	**Bit**	**Fault**
0h	PUF DC Bus Fuse Open	0h	EF3 External Fault - Terminal S3	0h	CE Modbus Communication Error
1h	UV1 DC Bus Undervoltage	1h	EF4 External Fault - Terminal S4	1h	BUS Bus Fault
2h	UV2 Control Circuit Undervoltage	2h	EF5 External Fault - Terminal S5	2h	Not Used
3h	UV3 Main Circuit Contactor Answerback Fault	3h	EF6 External Fault - Terminal S6	3h	Not Used
4h	Not Used	4h	EF7 External Fault - Terminal S7	4h	CF Out of Control Fault No Determination of Motor Speed
5h	GF Ground Fault	5h	EF8 External Fault - Terminal S8 (F7U/G7U Only)	5h	SVE Zero Servo Fault (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)
6h	OC Overcurrent Fault	6h	FAN Drive Cooling Fan Fault (models with internal cooling fans only)	6h	EF0 External Communications Fault
7h	OV Overvoltage Fault	7h	OS Overspeed Fault	7h	Not Used
8h	OH Heatsink Over temperature Fault	8h	DEV Speed Deviation Fault	8h	Not Used
9h	OH1 Drive Overheat Fault	9h	PGO PG Open, Encoder (Pulse Generator open circuit)	9h	Not Used
Ah	OL1 Motor Overload Fault	Ah	PF Input Phase Loss Fault	Ah	Not Used
Bh	OL2 Drive Overload Fault	Bh	LF Output Phase Loss	Bh	EF9 External Fault - Terminal S9 (G7U)
Ch	OL3 Overtorque Fault 1 (L6-02)	Ch	Not Used	Ch	EF10 External Fault - Terminal S10 (G7U)
Dh	OL4 Overtorque Fault 2 (L6-05)	Dh	OPR Operator Disconnected	Dh	EF11 External Fault - Terminal S11 (G7U)
Eh	RR Dynamic Braking Transistor Failure	Eh	ERR Eprom R/W Error	Eh	EF12 External Fault - Terminal S12 (G7U)
Fh	RH Dynamic Braking Resistor Overheat	Fh	Not Used	Fh	CPF Control Circuit Fault/Peripheral Fault

CIP Supported Objects

◆ Class 01h – Identity Object

Service Code No. (hex)	Service Name
01	Get Attribute All
05	RESET
0E	Get Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X		Word	1
	2	Maximum Instances	X		Word	1
1	1	Vendor ID	X		Word	44 (YASKAWA)
	2	Device Type	X		Word	2 (AC drives)
	3	Product Code	X		Word	Product/Model Dependant Code- *For factory use.* Refer to **Attribute 7-Product Name,** for drive family and model.
	4	Revision	X		Word	Software Dependent
	5	Status	X		Word	0
	6	Serial Number	X		Word	Each product's serial number is unique Range is 0x8200000 ~0x82FFFFF
	7	Product Name	X		String (14 Bytes)	Product Dependent*

* The product name is CIMR-[Drive Family][Drive Model]. A Product Name example would be CIMR-V7AM20P4. For a V7 drive, AM-spec, 200V class, 0.4 kW drive.

◆ Class 06h – Connection Manager Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X	-	Word	1

◆ Class 02h – Message Router Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X	-	Word	

◆ Class 04h – Assembly Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X	-	Word	1
20 (14h)	3	Data	X	-	Array 4 Bytes	00 00 00 00
21 (15h)	3	Data	X	-	Array 4 Bytes	00 00 00 00
22 (16h)	3	Data	X	-	Array 6 Bytes	00 00 00 00 00 00
23 (17h)	3	Data	X	-	Array 6 Bytes	00 00 00 00 00 00
70 (46h)	3	Data	X	-	Array 4 Bytes	00 00 00 00
71 (47h)	3	Data	X	-	Array 4 Bytes	00 00 00 00
72 (48h)	3	Data	X	-	Array 6 Bytes	00 00 00 00 00 00
73 (49h)	3	Data	X	-	Array 6 Bytes	00 00 00 00 00 00
101 (65h)	3	Data	X	-	Array 8 Bytes	00 00 00 00 00 00 00 00
115 (73h)	3	Data	X	-	Array 40 Bytes	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
151 (97h)	3	Data	X	-	Array 8 Bytes	00 00 00 00 00 00 00 00
155 (9Bh)	3	Data	X	-	Array 40 Bytes	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

◆ Class F5h – TCP/IP Object

Service Code No. (hex)	Service Name
01	Get Attribute All
0E	Get Attribute Single
10	Set Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X		Word	1
	2	Maximum Instance	X	-	Word	1
1	1	Status	X		Long	Bit 0: Not configured Bit 1: Configured Bit 2~31: Reserved
	2	Configuration Capability	X		Long	Bit 0: BootP Client Bit 1: DHCP Client Bit 2: DNS Client Bit 3: DHCP-DNS update Bit 4: Configuration Settable Bit 5~31: Reserved
	3	Configuration Control	X	X	Long	Bit 0~3: Start up Configuration Bit 4: DNS Enable Bit 5~31: Reserved
	4	Physical Link	X	-	Struct	Path (Word): EPATH
	5	Interface Configuration	X	X	Struct	IP Address (Long) Subnet Mask (Long) Gateway (Long) Name Server 1 (Long) Name Server 2 (Long) Domain Name (String)

◆ Class F6h - Ethernet Link Object

Service Code No. (hex)	Service Name
01	Get Attribute All
0E	Get Attribute Single
10	Set Attribute Single
4C	Get and Clear

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X	-	Word	1
	2	Maximum Instance	X		Word	1
1	1	Interface Speed	X		Long	10
	2	Interface Flags	X		Long	Bit 0: Link Status Bit 1: 0: Half Duplex 1: Full Duplex Bit 2 ~ 31: Reserved
	3	Physical Address (MAC ID)	X		Array 6 Words	Unique per assembly
	6	Interface Control	X	X	Struct	Control Bits: Word Forced Int Speed: Word

◆ Class 29h – Control Supervisor Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single
05	RESET

Attributes

Instance ID	Attribute	Description	Get	Set	Size	V7 Data
0	1	Object Software Revision	X	-	Word	1
1	3h	Run 1 (Forward Run)	X	X	Byte	Forward Run Command
	4h	Run 2 (Reverse Run)	X	X	Byte	Reverse Run Command
	5h	Net Control	X	X	Byte	Net Control Command - Parameter b1-02
	6h	State	X	-	Byte	Inverter Status
	7h	Running 1 (Forward)	X	-	Byte	Forward Running
	8h	Running 2 (Reverse)	X	-	Byte	Reverse Running
	9h	Ready	X	-	Byte	Inverter Ready
	10 (0Ah)	Faulted	X	-	Byte	Inverter Fault
	11 (0Bh)	Warning	X	-	Byte	Inverter Alarm
	12 (0Ch)	Fault Reset	X	X	Byte	Fault Reset
	13 (0Dh)	Fault Code	X	-	Word	Current Fault[1]
	14 (0Eh)	Warn Code	X	-	Word	Current Warning
	15 (0Fh)	Control from Net	X	-	Byte	Net Control Status - Parameter b1-02
	16 (10h)	CIP Fault Mode	X	-	Byte	Always “2”
	17 (11h)	Force Fault	X	X	Byte	External Fault - EF0
	18 (12h)	Force Status	X	-	Byte	External Fault Status - EF0

Note: [1] See Fault Code Conversions at the end of this section.

◆ Class 2Ah – AC Drive Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	F7U/G7U/P7U/E7U/G5M Data
0	1	Object Software Revision	X	-	Word	1
1	3h	At Reference	X	-	Byte	**Speed Agree**
	4h	Net Reference	X	X	Byte	**Net Reference Command - Parameter b1-01**
	6h	Drive Mode	X	X	Byte	**Control Method - Parameter A1-02**
	7h	Speed Actual	X	-	Word	**Output frequency – Monitor Parameter U1-02**
	8h	Speed Reference	X	X	Word	**Speed Command – Monitor Parameter U1-01**
	9h	Current Actual	X	-	Word	**Output Current – Monitor Parameter U1-03**
	10 (0Ah)	Current Limit	X	X	Word	**Motor Phase Current Limit**
	11 (0Bh)	Torque Actual	X	-	Word	**Actual Torque – Monitor Parameter U1-09** Converted Units: NM/2 ^(Torque Scale)
	12 (0Ch)	Torque Reference	X	X	Word	**Torque Limit** Converted Units: NM/2 ^(Torque Scale)
	15 (0Fh)	Power Actual	X	-	Word	**Actual Power - Monitor Parameter U1-08** Power Actual = [U1-08] * 100
	16 (10h)	Input Voltage	X	-	Word	**Input Voltage - Parameter E1-01**
	17 (11h)	Output Voltage	X	-	Word	**Output Voltage - Monitor Parameter U1-06** Output Voltage = [U1-06] /10
	18 (12h)	Accel Time	X	X	Word	**Accel Time 1 - Parameter C1-01** The unit must be converted to parameter C1-10 setting.
	19 (13h)	Decel Time	X	X	Word	**Decel Time 1 - Parameter C1-02** The unit must be converted to parameter C1-10 setting.
	20 (14h)	Low Speed Limit	X	X	Word	**Reference Lower Limit - Parameter D2-02** The unit must be converted if o1-03 = “2” to “39”.
	21 (15h)	High Speed Limit	X	X	Word	**Reference Upper Limit - Parameter D2-01** The unit must be converted if o1-03 is “2” to “39”.
	22 (16h)	Master Speed Reference Lower Limit (G7U only)	X	X	Word	**Parameter D2-03** The unit must be converted if o1-03 = “2” to “39”.
	23 (17h)	Speed Scale (-15 ~ +15)	X	X	Byte	Must be stored to EEPROM on the *EtherNet/IP Option Card*
	24 (18h)	Current Scale (-15 ~ +15)	X	X	Byte	Must be stored to EEPROM on the *EtherNet/IP Option Card*
	25 (19h)	Torque Scale (-15 ~ +15)	X	X	Byte	Must be stored to EEPROM on the *EtherNet/IP Option Card*
	26 (1Ah)	Power Scale (-15 ~ +15)	X	X	Byte	Must be stored to EEPROM on the *EtherNet/IP Option Card*
	27 (1Bh)	Voltage Scale (-15 ~ +15)	X	X	Byte	Must be stored to EEPROM on the *EtherNet/IP Option Card*
	28 (1Ch)	Time Scale (-15 ~ +15)	X	X	Byte	Must be stored to EEPROM on the *EtherNet/IP Option Card*
	29 (1Dh)	Reference from the Net (Status)	X	-	Byte	**NetRef Status – Parameter b1-01**

◆ Class 28h – Motor Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	F7U/G7U/P7U/E7U/G5M Data
0	1	Object Software Revision	X		Word	1
1	3	Motor 1 Type	X		Byte	7 (0 ~ 10)

Yaskawa Supported Objects

◆ Class 64h – Yaskawa Command Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object Software Revision	X		Word	1
1	1	Operation Command	X	X	Word	0
	2	Frequency Reference (0.01Hz)	X	X	Word	0
	3	Torque Reference (0.1%)	X	X	Word	1000
	4	Torque Compensation (0.1%)	X	X	Word	0
	5	Reserved				
	6	Analog Output 1 (Terminal 21)	X	X	Word	0
	7	Analog Output 2 (Terminal 23)	X	X	Word	0
	8	Digital Output	X	X	Word	0
	254 (FEh)	Accept Command (FFDDh)	X	X	Word	0
	255 (FFh)	Enter Command (FFFDh)	X	X	Word	0

Yaskawa Command Object – Class 64h, Instance 1, Attribute 1 – Operation Command	
Bit	**Definition**
0	Forward RUN (1) /Stop (0) Bits 1 and 2 may not be set simultaneously
1	Reverse RUN (1) /Stop (0) Bits 1 and 2 may not be set simultaneously
2	Terminal S3 – Multi-function Digital Input 1 – Parameter H1-01 setting
3	Terminal S4 – Multi-function Digital Input 2 – Parameter H1-02 setting
4	Terminal S5 – Multi-function Digital Input 3 – Parameter H1-03 setting
5	Terminal S6 – Multi-function Digital Input 4 – Parameter H1-04 setting
6	Terminal S7 – Multi-function Digital Input 5 – Parameter H1-05 setting
7	Terminal S8 – Multi-function Digital Input 6 – Parameter H1-06 setting (F7U, G7U and G5M only)
8	External Fault
9	Fault Reset
10	Reserved
11	Reserved
12	Reserved
13	Servo On (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)
14	Speed/Torque Control (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)
15	Reserved

Yaskawa Command Object – Class 64h, Instance 1, Attribute 8 – Digital Output	
Bit	**Definition**
0	PHC 1 – Multi-function Digital Output 1 – Parameter H2-01 setting*
1	PHC 2 – Multi-function Digital Output 2 – Parameter H2-02 setting*
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Fault Contact Enable
7	Fault Contact – Bit 6 must be set to 1 in order to enable the function of bit 7

* The type of physical outputs and their terminal designations for outputs controlled by bits 0 and 1 differ according to the drive. Refer to the appropriate drive user, programming and/or technical manual for details on digital outputs.

◆ Class 65h - Yaskawa Status Object

Service Code No. (hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

Attributes

Instance ID	Attribute	Description	Get	Set	Size	Default Value
0	1	Object software Revision	X		Word	1
1	1	Drive Status	X		Word	0
	2	Speed Feedback (o1-03 scaled)	X		Word	0
	3	Torque Reference (0.1%)	X		Word	0
	4	Speed Detection PG Count	X		Word	0
	5	Speed Reference (o1-03 scaled)	X		Word	0
	6	Output Frequency (o1-03 scaled)	X		Word	0
	7	Output Current*	X		Word	0
	8	Analog Input Channel 2	X		Word	0
	9	DC bus Voltage (1V)	X		Word	0
	10 (0Ah)	Fault Code 1	X		Word	0
	11 (0Bh)	Fault Code 2	X		Word	0
	12 (0Ch)	Fault Code 3	X		Word	0
	13 (0Dh)	Analog Input Channel 3 (F7U/G7U only)	X		Word	0
	14 (0Eh)	Digital Input 2	X		Word	0
	15 (0Fh)	Analog Input Channel 1	X		Word	0
	16 (10h)	Channel 2 PG Counter	X		Word	0

* Parameter o2-04 for kVA model - Scaling is 0.01A for kVA models 00h ~ 06h and 20h ~ 26h

◆ Class 65, Instance 1, Attribute 1, Drive Status

Attribute 1 - Drive Status Word	
Bit	**Status**
0h	Drive Running
1h	Zero Speed
2h	Reverse Running
3h	Reset Command Received
4h	Speed Agree
5h	Inverter Ready
6h	Alarm Condition
7h	Fault Condition
8h	Not Used
9h	Momentary Power Loss Ride Thru
Ah	Local / Remote
Bh	Digital Output 1
Ch	Digital Output 2
Dh	Digital Output 3 (F7U/G7U Only)
Eh	Motor Selection
Fh	Zero Servo Complete (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only)

◆ Class 65 – Yaskawa Status Object (continued)

Attribute 10 - Fault Code Word 1		**Attribute 11** - Fault Code Word 2		**Attribute 12** - Fault Code Word 3	
Bit	**Fault**	**Bit**	**Fault**	**Bit**	**Fault**
0h	PUF DC Bus Fuse Open	0h	EF3 External Fault - Terminal S3	0h	CE Modbus Communication Error
1h	UV1 DC Bus Undervoltage	1h	EF4 External Fault - Terminal S4	1h	BUS Bus Fault
2h	UV2 Control Circuit Undervoltage	2h	EF5 External Fault - Terminal S5	2h	Not Used
3h	UV3 Main Circuit Contactor Answerback Fault	3h	EF6 External Fault - Terminal S6	3h	Not Used
4h	Not Used	4h	EF7 External Fault - Terminal S7	4h	CF Out of Control Fault No Determination of Motor Speed
5h	GF Ground Fault	5h	EF8 External Fault - Terminal S8 (F7U/G7U Only)	5h	SVE Zero Servo Fault (F7U, G7 and G5 in (F7U, G7U and G5M in Closed-loop flux vector mode (FVC) only))
6h	OC Overcurrent Fault	6h	FAN Drive Cooling Fan Fault (models with internal cooling fans only)	6h	EF0 External Communications Fault
7h	OV Overvoltage Fault	7h	OS Overspeed Fault	7h	Not Used
8h	OH Heatsink Over temperature Fault	8h	DEV Speed Deviation Fault	8h	Not Used
9h	OH1 Drive Overheat Fault	9h	PGO PG Open, Encoder (Pulse Generator Open Circuit)	9h	Not Used
Ah	OL1 Motor Overload Fault	Ah	PF Input Phase Loss Fault	Ah	Not Used
Bh	OL2 Drive Overload Fault	Bh	LF Output Phase Loss	Bh	EF9 External Fault - Terminal S9 (G7U)
Ch	OL3 Overtorque Fault 1 (L6-02)	Ch	Not Used	Ch	EF10 External Fault - Terminal S10 (G7U)
Dh	OL4 Overtorque Fault 2 (L6-05)	Dh	OPR Operator Disconnected	Dh	EF11 External Fault - Terminal S11 (G7U)
Eh	RR Dynamic Braking Transistor Failure	Eh	ERR Eprom R/W Error	Eh	EF12 External Fault - Terminal S12 (G7U)
Fh	RH Dynamic Braking Resistor Overheat	Fh	Not Used	Fh	CPF Control Circuit Fault/Peripheral Fault

Fault Code Conversions

Table 1.7 – Drive Fault Messages *(by EtherNet/IP Communication)*					
***EtherNet/IP* Fault Code [hex]**	**Drive Fault Code [hex]**	**Description**	***EtherNet/IP* Fault Code [hex]**	**Drive Fault Code [hex]**	**Description**
0000h	0	None	6320h	1Fh	EEPROM R/W Error (ERR)
2120h	6	Ground Fault (GF)	7110h	0Fh	Dynamic Braking Transistor (RR)
2130h	5	Short Circuit (SC)	7112h	10h	Dynamic Braking Resistor (RH)
2200h	0Ch	Inverter Overload (OL2)	7301h	1Ah	PG Open (PGO) [1]
2220h	0Bh	Motor Overload (OL1)	7310h	18h	Overspeed Detection (OS) [1]
2221h	0Dh	Overtorque Detection 1 (OL3) [1]	7310h	19h	Speed Deviation (DEV) [1]
2222h	0Eh	Overtorque Detection 2 (OL4) [1]	7500h	21h	*EtherNet/IP* Communication Error (BUS)
2300h	7	Overcurrent (OC)	7500h	22h	*EtherNet/IP* Communication Error
2310h	28h	High Slip Braking (OL7) [2]	7500h	23h	-
3130h	1Bh	Input Phase Loss (PF)	7500h	24h	-
3130h	1Ch	Output Phase Loss (LF)	8110h	2Bh	Feedback Loss (FBL) [1]
3210h	8	DC Bus Overvoltage (OV)	8313h	26h	Zero Servo Fault (SVE) [1]
3220h	2	DC Bus Undervoltage (UV1)	8321h	25h	Out of Control (CF)
3222h	4	MC Answerback (UV3)	8321h	29h	Undertorque Detection 1 (UL3) [1]
4200h	9	Heatsink Over-temperature (OH)	8321h	2Ah	Undertorque Detection 2 (UL4) [1]
4210h	0Ah	Heatsink Maximum Temperature (OH1)	9000h	11h	External Fault 3 (EF3)
4300h	2Ch	Motor Overheat 1 (OH3)	9000h	12h	External Fault 4 (EF4)
4310h	2Dh	Motor Overheat 2 (OH4)	9000h	13h	External Fault 5 (EF5)
5110h	3	CTL PS Undervoltage (UV2)	9000h	14h	External Fault 6 (EF6)
5120h	1	DC Bus Fuse Open (PUF)	9000h	15h	External Fault 7 (EF7)
5300h	1Eh	Operator Disconnected (OPR)	9000h	16h	External Fault 8 (EF8)
5300h	1Eh	OPE Errors	9000h	27h	External Fault 0 (EF0)

[1] G5, F7 & G7 drives

[2] F7 & G7 drives

Notes

Chapter 4 Product Specification

This section describes the specification for the EtherNet/IP Option Card.

Product Specification 4-2
Firmware Description 4-2

Product Specification

Operating Temperature:	0 to 55°C
Storage Temperature:	-20 to 70°C
Humidity:	90% Relative Humidity (no condensing)
Vibration:	1G at less than 20Hz, up to 0.2G at 20 to 50Hz
Altitude:	3300ft or less

Firmware Description

◆ Status Support

The following Status Assembly information is available in the EtherNet/IP interface, which is implemented as the normal heartbeat information in CIP. The following states of the device along with the additional flags provide for monitoring the EtherNet/IP enabled Yaskawa drives.

Value	State	
0	Non-Existent	
1	Device Self-test	
2	Standby	
3	Operational	
4	Major Fault -Recoverable	
5	Major Fault -Unrecoverable	
EV_	Event Flag	An Event has Occurred
SF_	System Fault	Connection or BUS Fault
UF_	User Fault	User Interaction Inhibited Operation
DF_	Device Fault	Drive or Hardware Fault

◆ Protocols

Standard TCP/IP and UDP/IP are implemented with the support of SNMP for network diagnostic features support. ARP, ICMP, and IGMP are supported for interoperable operation in IP networks.

◆ Ports

EtherNet/IP: Port 0xAF12 for encapsulation packets, services and CPF-session management
Port 0x08AE for I/O connections supported with timeout configurations.
Web: Port 80 (Http)
Telnet: Port 23(Telnet)

◆ Connections

The maximum number of simultaneous connections is: 1 for I/O, 4 for Explicit, 2 for Drive Wizard™.

◆ Cable Loss and Timeout

Timeout is calculated based on RPI configuration parameter on startup. It is specified in seconds. A setting of "0" disables the timeout. The default cable loss timeout is RPI* 4.

◆ ENTER and ACCEPT

The ENTER and ACCEPT commands are translated internally. ENTER and ACCEPT usage is determined by the identity of the drive.

Notes

Chapter 5 Parameter Tables

Class/Instance/Attribute Tables 5-2
Hexadecimal/Decimal Conversion 5-22

Class/Instance/Attribute Tables

The following tables list all the drive monitors and parameters that are supported by the *EtherNet/IP Option Card*. Each drive has its own set of Classes (CLASS), Instances (INST), and Attributes (ATTR) for each monitor and parameter, so be sure to reference the proper column for the drive. For further details on the drive monitor and parameter, please see the appropriate drive User Manual (TM.E7.01, TM.F7.01, TM.P7.01, TM.G7.01, TM 4515, TM 4025, TM.G5HHP.01). G5M refers to G5M (F Spec), G5M (600V) and G5M(HHP) drives inclusively.

Instance ID 0 of each of the following tables is the Object Software Revision, Service GET, Data Type Word, 2 Bytes and Default Value 1. Table cells that do not contain a value either do not exist or are not available for that particular drive.

◆ Class 66h, Instance 1 - Monitor Parameters 1

Monitor parameters all share the same service (GET), data type (Word) and number of bytes (2)

Monitor	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
-	Fault Register 1	21 (15h)				21 (15h)
-	Fault Register 2	22 (16h)				22 (16h)
-	Fault Register 3	23 (17h)				23 (17h)
-	Fault Register 4	24 (18h)				24 (18h)
-	Fault Register 5	25 (19h)				25 (19h)
U1-01	Frequency Reference Hz	65 (41h)	65 (41h)	65 (41h)	65 (41h)	33 (21h)
U1-02	Output Frequency Hz	66 (42h)	66 (42h)	66 (42h)	66 (42h)	34 (22h)
U1-03	Output Current A	67 (43h)	67 (43h)	67 (43h)	67 (43h)	35 (23h)
U1-04	Control Method	68 (44h)	68 (44h)			36 (24h)
U1-05	Motor Speed Hz	69 (45h)	69 (45h)			37 (25h)
U1-06	Output Voltage VAC	70 (46h)	70 (46h)	70 (46h)	70 (46h)	38 (26h)
U1-07	DC Bus Voltage VDC	71 (47h)	71 (47h)	71 (47h)	71 (47h)	39 (27h)
U1-08	Output Power kW	72 (48h)	72 (48h)	72 (48h)	72 (48h)	40 (28h)
U1-09	Torque Reference %	73 (49h)	73 (49h)			41 (29h)
U1-10	Input Terminal Status	74 (4Ah)	74 (4Ah)	74 (4Ah)	74 (4Ah)	42 (2Ah)
U1-11	Output Terminal Status	75 (4Bh)	75 (4Bh)	75 (4Bh)	75 (4Bh)	43 (2Bh)
U1-12	Internal Control Status/Inv Status	76 (4Ch)	76 (4Ch)	76 (4Ch)	76 (4Ch)	44 (2Ch)
U1-13	Elapsed Time Hr	77 (4Dh)	77 (4Dh)	77 (4Dh)	77 (4Dh)	45 (2Dh)
U1-14	Flash ID	78 (4Eh)	78 (4Eh)	78 (4Eh)	78 (4Eh)	46 (2Eh)
U1-15	Terminal A1 Level %	79 (4Fh)	79 (4Fh)	79 (4Fh)	79 (4Fh)	47 (2Fh)
U1-16	Terminal A2 Level %	80 (50h)	80 (50h)	80 (50h)	80 (50h)	48 (30h)
U1-17	Terminal A3 Level %	81 (51h)	81 (51h)			49 (31h)
U1-18	Motor SEC Current %	82 (52h)	82 (52h)	82 (52h)	82 (52h)	50 (32h)
U1-19	Motor EXE Current %	83 (53h)	83 (53h)			
U1-20	Softstarter SFS Output Hz	84 (54h)	84 (54h)	84 (54h)	84 (54h)	52 (34h)
U1-21	ASR Input %	85 (55h)	85 (55h)			53 (35h)
U1-22	ASR Output %	86 (56h)	86 (56h)			54 (36h)
U1-23	Speed Deviation					55 (37h)
U1-24	PID Feedback %	88 (58h)	88 (58h)	88 (58h)	88 (58h)	56 (38h)
U1-25	DI-16 Reference	89 (59h)	89 (59h)			57 (39h)
U1-26	Voltage Reference (Vq) VAC	90 (5Ah)	90 (5Ah)			58 (3Ah)
U1-27	Voltage Reference (Vd) VAC	91 (5Bh)	91 (5Bh)			59 (3Bh)
U1-28	CPU ID	92 (5Ch)	92 (5Ch)	92 (5Ch)	92 (5Ch)	60 (3Ch)
U1-29	kWh Monitor	93 (5Dh)	93 (5Dh)	93 (5Dh)	93 (5Dh)	

Monitor	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
U1-30	MWh Monitor kWh	94 (5Eh)	94 (5Eh)	94 (5Eh)	94 (5Eh)	
U1-32	ACR (q) Output %	96 (60h)	96 (60h)			62 (3Eh)
U1-33	ACR (d) Output %	97 (61h)	97 (61h)			63 (3Fh)
U1-34	OPE Detected	98 (62h)	98 (62h)	98 (62h)	98 (62h)	64 (40h)
U1-35	Zero Servo Pulse	99 (63h)	99 (63h)			
U1-36	PID Input	100 (64h)	100 (64h)	100 (64h)	100 (64h)	
U1-37	PID Output	101 (65h)	101(65h)	101 (65h)	101 (65h)	
U1-38	PID Setpoint	102 (66h)	102 (66h)	102 (67h)	102 (67h)	
U1-39	Modbus Error Code	103 (67h)	103 (67h)	103 (67h)	103 (67h)	
U1-40	Fan Operation Time Hr	104 (68h)	104 (68h)	104 (68h)	104 (68h)	
U1-41	Cooling Fan Temperature deg		105 (69h)			
U1-42	Motor Magnetic Flux Calculation %		106 (6Ah)			
U1-43	Motor Magnetic Flux A Compensation Value		107 (6Bh)			
U1-44	Output Feedback Control %	108 (6Ch)	108 (6Ch)			
U1-45	Feed Forward Control Output %	109 (6Dh)	109 (6Dh)			
U1-46	Feed Forward Control Presumption Speed Hz		110 (6Eh)			
U1-47	Speed Estimation Gain		111 (6Fh)			
U1-48	Stabilizing Speed During Regeneration		112 (70h)			
U1-49	CPU Share %		113 (71h)			
U1-50	CF Fault Error Code		114 (72h)			
U1-51	AUTO Mode Reference			115 (73h)	115 (73h)	
U1-52	HAND Mode Reference			116 (74h)	116 (74h)	
U1-53	PI Feedback 2			117 (77h)	117 (77h)	

◆ Class 73h, Instance 1 - Fault Monitors/G5M CASE Monitors* U1-50 ~ U1-59*

*CASE Monitors are only used in custom drive software.
Monitor parameters all share the same service (GET), data type (Word) and number of bytes (2)

Monitor	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
U2-01	Current Fault	1	1	1	1	1
U2-02	Previous Fault	2	2	2	2	2
U2-03	Frequency Reference at Previous Fault	3	3	3	3	3
U2-04	Output Frequency at Previous Fault	4	4	4	4	4
U2-05	Output Current at Previous Fault	5	5	5	5	5
U2-06	Motor Speed at Previous Fault	6	6			6
U2-07	Output Voltage at Previous Fault	7	7	7	7	7
U2-08	DC Bus Voltage at Previous Fault	8	8	8	8	8
U2-09	Output Power at Previous Fault	9	9	9	9	9
U2-10	Torque Reference at Previous Fault	10 (0Ah)	10 (0Ah)			
U2-11	Input Terminal Status at Previous Fault	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
U2-12	Output Terminal Status at Previous Fault	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
U2-13	Drive Operation Status at Previous Fault	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)
U2-14	Cumulative Operation Time at Previous Fault	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)
U3-01	Most Recent Fault	17 (11h)	17 (11h)	17 (11h)	17 (11h)	17 (11h)
U3-02	2nd Most Recent Fault	18 (12h)	18 (12h)	18 (12h)	18 (12h)	18 (12h)
U3-03	3rd Most Recent Fault	19 (13h)	19 (13h)	19 (13h)	19 (13h)	19 (13h)
U3-04	4th Most Recent Fault	20 (14h)	20 (14h)	20 (14h)	20 (14h)	20 (14h)
U3-05	Cumulative Operation Time at Most Recent Fault	21 (15h)	21 (15h)	21 (15h)	21 (15h)	21 (15h)
U3-06	Cumulative Operation Time at 2nd Most Recent Fault	22 (16h)	22 (16h)	22 (16h)	22 (16h)	22 (16h)
U3-07	Cumulative Operation Time at 3rd Most Recent Fault	23 (17h)	23 (17h)	23 (17h)	23 (17h)	23 (17h)
U3-08	Cumulative Operation Time at 4th Most Recent Fault	24 (18h)	24 (18h)	24 (18h)	24 (18h)	24 (18h)
U1-50	CASE Monitor 1					81 (65h)
U1-51	CASE Monitor 2					82 (66h)
U1-52	CASE Monitor 3					83 (67h)
U1-53	CASE Monitor 4					84 (68h)
U1-54	CASE Monitor 5					85 (69h)
U1-55	CASE Monitor 6					86 (6Ah)
U1-56	CASE Monitor 7					87 (6Bh)
U1-57	CASE Monitor 8					88 (6Ch)
U1-58	CASE Monitor 9					89 (6Dh)
U1-59	CASE Monitor 10					90 (6Eh)

◆ Class 74h, Instance 1 - Extended Fault History

Monitor parameters all share the same service (GET), data type (Word) and number of bytes (2)

Monitor	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
U3-09	Fault Message 5	5	5	5	5	-
U3-10	Fault Message 6	6	6	6	6	-
U3-11	Fault Message 7	7	7	7	7	-
U3-12	Fault Message 8	8	8	8	8	-
U3-13	Fault Message 9	9	9	9	9	-
U3-14	Fault Message 10	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	-
U3-15	Elapsed Time 5	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)	-
U3-16	Elapsed Time 6	16 (10h)	16 (10h)	16 (10h)	16 (10h)	-
U3-17	Elapsed Time 7	17 (11h)	17 (11h)	17 (11h)	17 (11h)	-
U3-18	Elapsed Time 8	18 (12h)	18 (12h)	18 (12h)	18 (12h)	-
U3-19	Elapsed Time 9	19 (13h)	19 (13h)	19 (13h)	19 (13h)	-
U3-20	Elapsed Time 10	20 (14h)	20 (14h)	20 (14h)	20 (14h)	-

◆ Class 75h, Instance 1 - 7-Series Drive CASE Monitors* U1-90~U1-99

*CASE Parameters are only used in custom drive software.
Monitor parameters all share the same service (GET), data type (Word) and number of bytes (2)

Monitor	Name	Attribute [hex]			
		F7U	G7U	P7U	E7U
U1-90	CASE Monitor 1	1	1	1	1
U1-91	CASE Monitor 2	2	2	2	2
U1-92	CASE Monitor 3	3	3	3	3
U1-93	CASE Monitor 4	4	4	4	4
U1-94	CASE Monitor 5	5	5	5	5
U1-95	CASE Monitor 6	6	6	6	6
U1-96	CASE Monitor 7	7	7	7	7
U1-97	CASE Monitor 8	8	8	8	8
U1-98	CASE Monitor 9	9	9	9	9
U1-99	CASE Monitor 10	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)

◆ Class 67h, Instance 1 - Initialize/User Object

AX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
A1-00	Selection Language	1	1	1	1	1
A1-01	Access Level	2	2	2	2	2
A1-02	Control Method	3	3	-	-	3
A1-03	Initialize Parameters	4	4	4	4	4
A1-04	Enter Password	5	5	5	5	5
A1-05	Selection Password	6	6	6	6	-
A2-01	User Parameter	7	7	7	7	7
A2-02	User Parameter	8	8	8	8	8
A2-03	User Parameter	9	9	9	9	9
A2-04	User Parameter	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)
A2-05	User Parameter	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
A2-06	User Parameter	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
A2-07	User Parameter	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)
A2-08	User Parameter	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)
A2-09	User Parameter	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)
A2-10	User Parameter	16 (10h)	16 (10h)	16 (10h)	16 (10h)	16 (10h)
A2-11	User Parameter	17 (11h)	17 (11h)	17 (11h)	17 (11h)	17 (11h)
A2-12	User Parameter	18 (12h)	18 (12h)	18 (12h)	18 (12h)	18 (12h)
A2-13	User Parameter	19 (13h)	19 (13h)	19 (13h)	19 (13h)	19 (13h)
A2-14	User Parameter	20 (14h)	20 (14h)	20 (14h)	20 (14h)	20 (14h)
A2-15	User Parameter	21 (15h)	21 (15h)	21 (15h)	21 (15h)	21 (15h)
A2-16	User Parameter	22 (16h)	22 (16h)	22 (16h)	22 (16h)	22 (16h)
A2-17	User Parameter	23 (17h)	23 (17h)	23 (17h)	23 (17h)	23 (17h)
A2-18	User Parameter	24 (18h)	24 (18h)	24 (18h)	24 (18h)	24 (18h)
A2-19	User Parameter	25 (19h)	25 (19h)	25 (19h)	25 (19h)	25 (19h)
A2-20	User Parameter	26 (1Ah)	26 (1Ah)	26 (1Ah)	26 (1Ah)	26 (1Ah)
A2-21	User Parameter	27 (1Bh)	27 (1Bh)	27 (1Bh)	27 (1Bh)	27 (1Bh)
A2-22	User Parameter	28 (1Ch)	28 (1Ch)	28 (1Ch)	28 (1Ch)	28 (1Ch)
A2-23	User Parameter	29 (1Dh)	29 (1Dh)	29 (1Dh)	29 (1Dh)	29 (1Dh)
A2-24	User Parameter	30 (1Eh)	30 (1Eh)	30 (1Eh)	30 (1Eh)	30 (1Eh)
A2-25	User Parameter	31 (1Fh)	31 (1Fh)	31 (1Fh)	31 (1Fh)	31 (1Fh)
A2-26	User Parameter	32 (20h)	32 (20h)	32 (20h)	32 (20h)	32 (20h)
A2-27	User Parameter	33 (21h)	33 (21h)	33 (21h)	33 (21h)	33 (21h)
A2-28	User Parameter	34 (22h)	34 (22h)	34 (22h)	34 (22h)	34 (22h)
A2-29	User Parameter	35 (23h)	35 (23h)	35 (23h)	35 (23h)	35 (23h)
A2-30	User Parameter	36 (24h)	36 (24h)	36 (24h)	36 (24h)	36 (24h)
A2-31	User Parameter	37 (25h)	37 (25h)	37 (25h)	37 (25h)	37 (25h)
A2-32	User Parameter	38 (26h)	38 (26h)	38 (26h)	38 (26h)	38 (26h)

◆ Class 68h, Instance 1 - Application Object

bX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
b1-01	Reference Source	1	1	1	1	1
b1-02	Run Source	2	2	2	2	2
b1-03	Stopping Method	3	3	3	3	3
b1-04	Reverse Operation	4	4	4	4	4
b1-05	Zero Speed Operation	5	5			5
b1-06	Control Input Scans	6	6			6
b1-07	Local/Remote Run Selection	7	7	7	7	7
b1-08	Run Command at Programming	8	8	8	8	
b1-10	Zero Speed Operation Selection		95 (5Fh)			
b1-11	Wait to Run Time			96 (60h)	96 (60h)	
b1-12	Hand Reference Source				97 (61h)	
b2-01	DC Injection Start Frequency Hz	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	8
b2-02	DC Injection Current %	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	9
b2-03	DC Injection Time @start Sec	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	10 (0Ah)
b2-04	DC Injection Time @stop Sec	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	11 (0Bh)
b2-08	Field Compensation	17 (11h)	17 (11h)			
b2-09	Motor Pre-heat Current			98 (62h)	98 (62h)	
b3-01	Speed Search @ Start	18 (12h)	18 (12h)	18 (12h)	18 (12h)	15 (0Fh)
b3-02	Speed Search Current %	19 (13h)	19 (13h)	19 (13h)	19 (13h)	16 (10h)
b3-03	Speed Search Decel Time Sec	20 (14h)	20 (14h)	20 (14h)	20 (14h)	17 (11h)
b3-04	Speed Search V/F		21 (15h)			
b3-05	Search Wait Time	22 (16h)	22 (16h)	22 (16h)	22 (16h)	
b3-10	Speed Search Detection Compensation Gain	27 (1Bh)	27 (1Bh)			
b3-14	Bi-Directional Search Selection	31 (1Fh)	31 (1Fh)	31 (1Fh)	31 (1Fh)	
b4-01	Delay On Timer Sec	36 (24h)	36 (24h)	36 (24h)	36 (24h)	19 (13h)
b4-02	Delay Off Timer Sec	37 (25h)	37 (25h)	37 (25h)	37 (25h)	20 (14h)
b5-01	PID Mode	38 (26h)	38 (26h)	38 (26h)	38 (26h)	21 (15h)
b5-02	PID Gain	39 (27h)	39 (27h)	39 (27h)	39 (27h)	22 (16h)
b5-03	PID I Time	40 (28h)	40 (28h)	40 (28h)	40 (28h)	23 (17h)
b5-04	PID I Limit %	41 (29h)	41 (29h)	41 (29h)	41 (29h)	24 (18h)
b5-05	PID D Time Sec	42 (2Ah)	42 (2Ah)	42 (2Ah)	42 (2Ah)	25 (19h)
b5-06	PID Limit %	43 (2Bh)	43 (2Bh)	43 (2Bh)	43 (2Bh)	26 (1Ah)
b5-07	PID Offset %	44 (2Ch)	44 (2Ch)	44 (2Ch)	44 (2Ch)	27 (1Bh)
b5-08	PID Delay Time Sec	45 (2Dh)	45 (2Dh)	45 (2Dh)	45 (2Dh)	28 (1Ch)
b5-09	Output Level Selection	46 (2Eh)	46 (2Eh)	46 (2Eh)	46 (2Eh)	
b5-10	PID Output Gain	47 (2Fh)	47 (2Fh)	47 (2Fh)	47 (2Fh)	
b5-11	Output Reverse Selection	48 (30h)	48 (30h)	48 (30h)	48 (30h)	
b5-12	Feedback Loss Detection Selection	49 (31h)	49 (31h)	49 (31h)	49 (31h)	
b5-13	Feedback Loss Detection Level %	50 (32h)	50 (32h)	50 (32h)	50 (32h)	
b5-14	Feedback Loss Detection Time Sec	51 (33h)	51 (33h)	51 (33h)	51 (33h)	
b5-15	PID Sleep Level Hz	52 (34h)	52 (34h)	52 (34h)	52 (34h)	
b5-16	PID Sleep Time Sec	53 (35h)	53 (35h)	53 (35h)	53 (35h)	
b5-17	PID SFS Time Sec	54 (36h)	54 (36h)	54 (36h)	54 (36h)	

◆ Class 68h, Instance 1 - Application Object (continued)

bX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
b5-18	PID Set Point Selection	93 (5Dh)	93 (5Dh)	93 (5Dh)	93 (5Dh)	
b5-19	PID Set Point	94 (5Eh)	94 (5Eh)	94 (5Eh)	94 (5Eh)	
b5-20	PI Set Point Display Scaling			99 (63h)	99 (63h)	
b5-21	PI Sleep Input Source			100 (64h)	100 (64h)	
b5-22	PI Snooze Level			101 (65h)	101 (65h)	
b5-23	PI Snooze Delay Time Sec			102 (66h)	102 (66h)	
b5-24	PI Snooze Deactivation Level			103 (67h)	103 (67h)	
b5-25	PI Set Point Boost Setting %			104 (68h)	104 (68h)	
b5-26	PI Maximum Boost Time sec			105 (69h)	105 (69h)	
b5-27	PI Snooze Feedback Level %			106 (6Ah)	106 (6Ah)	
b5-28	PI Feedback Root Function			107 (6Bh)	107 (6Bh)	
b5-29	PI Root Gain			108 (6Ch)	108 (6Ch)	
b5-30	PI Out Root Function			109 (6Dh)	109 (6Dh)	
b6-01	Dwell Reference @ Start Hz	55 (37h)	55 (37h)			29 (1Dh)
b6-02	Dwell Time @ Start Sec	56 (38h)	56 (38h)			30 (1Eh)
b6-03	Dwell Reference @ Stop Hz	57 (39h)	57 (39h)			31 (1Fh)
b6-04	Dwell Time @ Stop Sec	58 (3Ah)	58 (3Ah)			32 (20h)
b7-01	Droop Quantity %	75 (4Bh)	75 (4Bh)			33 (21h)
b7-02	Droop Delay Time Sec	76 (4Ch)	76 (4Ch)			34 (22h)
b8-01	Energy Save Selection	77 (4Dh)	77 (4Dh)	77 (4Dh)	77 (4Dh)	35 (23h)
b8-02	Energy Save Gain	78 (4Eh)	78 (4Eh)			36 (24h)
b8-03	Energy Save Filter Time Sec	79 (4Fh)	79 (4Fh)			
b8-04	Energy Saving Coefficient	80 (50h)	80 (50h)	80 (50h)	80 (50h)	
b8-05	kW Filter Time mS	81 (51h)	81 (51h)	81 (51h)	81 (51h)	
b8-06	Search Voltage Limit %	82 (52h)	82 (52h)	82 (52h)	82 (52h)	
b9-01	Zero Servo Gain	91 (5Bh)	91 (5Bh)			37 (25h)
b9-02	Zero Servo Count	92 (5Ch)	92 (5Ch)			38 (26h)

◆ Class 69h, Instance 1 - Tuning Object

CX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
C1-01	Accel Time 1 Sec	1	1	1	1	1
C1-02	Decel Time 1 Sec	2	2	2	2	2
C1-03	Accel Time 2 Sec	3	3	3	3	3
C1-04	Decel Time 2 Sec	4	4	4	4	4
C1-05	Accel Time 3 Sec	5	5			5
C1-06	Decel Time 3 Sec	6	6			6
C1-07	Accel Time 4 Sec	7	7			7
C1-08	Decel Time 4 Sec	8	8			8
C1-09	Fast Stop Time Sec	9	9	9	9	9
C1-10	Accel/Decel Units	10 (0Ah)	10 (0Ah)			10 (0Ah)
C1-11	Accel/Decel Switchover Frequency Hz	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
C2-01	S-Curve @ Accel Start Sec	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
C2-02	S-Curve @ Accel End Sec	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)
C2-03	S-Curve @ Decel Start Sec	14 (0Eh)	14 (0Eh)			14 (0Eh)
C2-04	S-Curve @ Decel End Sec	15 (0Fh)	15 (0Fh)			15 (0Fh)
C3-01	Slip Compensation Gain	16 (10h)	16 (10h)			16 (10h)
C3-02	Slip Compensation Time mS	17 (11h)	17 (11h)			17 (11h)
C3-03	Slip Compensation Limit %	18 (12h)	18 (12h)			18 (12h)
C3-04	Slip Compensation Regeneration	19 (13h)	19 (13h)			19 (13h)
C3-05	Flux Selection	20 (14h)	20 (14h)			68 (43h)
C4-01	Torque Compensation Gain	22 (16h)	22 (16h)	22 (16h)	22 (16h)	20 (14h)
C4-02	Torque Compensation Time mS	23 (17h)	23 (17h)	23 (17h)	23 (17h)	21 (15h)
C4-03	Forward Torque Compensation @ Start %	24 (18h)	24 (18h)			
C4-04	Reverse Torque Compensation @ Start %	25 (19h)	25 (19h)			
C4-05	Torque Compensation Delay Time mS	26 (1Ah)	26 (1Ah)			
C5-01	ASR P Gain 1	28 (1Ch)	28 (1Ch)			22 (16h)
C5-02	ASR I Time 1 Sec	29 (1Dh)	29 (1Dh)			23 (17h)
C5-03	ASR P Gain 2	30 (1Eh)	30 (1Eh)			24 (18h)
C5-04	ASR I Time 2 Sec	31 (1Fh)	31 (1Fh)			25 (19h)
C5-05	ASR Limit %	32 (20h)	32 (20h)			26 (1Ah)
C5-06	ASR Delay Time Sec	33 (21h)	33 (21h)			27 (1Bh)
C5-07	ASR Gain SW Frequency Hz	34 (22h)	34 (22h)			28 (1Ch)
C5-08	ASR I Limit %	35 (23h)	35 (23h)			66 (42h)
C5-10	ASR Delay Time 2		50 (32h)			
C6-01	Carrier Frequency Maximum	36 (24h)		36 (24h)	36 (24h)	29 (1Dh)
C6-02	Carrier Frequency Selection	37 (25h)	37 (25h)	37 (25h)	37 (25h)	
C6-03	Carrier Frequency Maximum kHz	38 (26h)	38 (26h)	38 (26h)	38 (26h)	
C6-04	Carrier Frequency Minimum kHz	39 (27h)	39 (27h)	39 (27h)	39 (27h)	30 (1Eh)[1]
C6-05	Carrier Frequency Gain %	40 (28h)	40 (28h)	40 (28h)	40 (28h)	31 (1Fh)[2]
C6-11	Carrier Frequency Selection		46 (38h)			
C7-01	Hunting Prevention Selection					32 (20h)
C7-02	Hunting Prevention Gain					33 (21h)
C8-08	AFR Gain					43 (2Bh)

◆ Class 69h, Instance 1 - Tuning Object (Continued)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
C8-09	AFR Time					44 (2Ch)
C8-30	Carrier During Rotational Auto-tune					65 (41h)
C9-04	CT/VT Selection					76 (4Ch)

[1] C6-02 in G5M

[2] C6-03 in G5M

◆ Class 6Ah, Instance 1 - Reference Object

dX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
d1-01	Frequency Reference 1 Hz	1	1	1	1	1
d1-02	Frequency Reference 2 Hz	2	2	2	2	2
d1-03	Frequency Reference 3 Hz	3	3	3	3	3
d1-04	Frequency Reference 4 Hz	4	4	4	4	4
d1-05	Frequency Reference 5 Hz	5	5			5
d1-06	Frequency Reference 6 Hz	6	6			6
d1-07	Frequency Reference 7 Hz	7	7			7
d1-08	Frequency Reference 8 Hz	8	8			8
d1-09	Frequency Reference 9 Hz	9	9			
d1-10	Frequency Reference 10 Hz	12 (0Ch)	12 (0Ch)			
d1-11	Frequency Reference 11 Hz	13 (0Dh)	13 (0Dh)			
d1-12	Frequency Reference 12 Hz	14 (0Eh)	14 (0Eh)			
d1-13	Frequency Reference 13 Hz	15 (0Fh)	15 (0Fh)			
d1-14	Frequency Reference 14 Hz	16 (10h)	16 (10h)			
d1-15	Frequency Reference 15 Hz	17 (11h)	17 (11h)			
d1-16	Frequency Reference 16 Hz	18 (12h)	18 (12h)			
d1-17	Jog Reference Hz	19 (13h)	19 (13h)	19 (13h)	19 (13h)	9 [3]
d2-01	Reference Lower Limit %	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)
d2-02	Reference Upper Limit %	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
d2-03	Master Lower Limit %	20 (14h)	20 (14h)	20 (14h)	20 (14h)	
d3-01	Jump Frequency 1 Hz	21 (15h)	21 (15h)	21 (15h)	21 (15h)	12 (0Ch)
d3-02	Jump Frequency 2 Hz	22 (16h)	22 (16h)	22 (16h)	22 (16h)	13 (0Dh)
d3-03	Jump Frequency 3 Hz	23 (17h)	23 (17h)	23 (17h)	23 (17h)	14 (0Eh)
d3-04	Jump Bandwidth Hz	24 (18h)	24 (18h)	24 (18h)	24 (18h)	15 (0Fh)
d4-01	MOP Reference Memory	25 (19h)	25 (19h)	25 (19h)	25 (19h)	16 (10h)
d4-02	Trim Control Level %	26 (1Ah)	26 (1Ah)	26 (1Ah)	26 (1Ah)	17 (11h)
d5-01	Torque Control Selection	27 (1Bh)	27 (1Bh)			18 (12h)
d5-02	Torque Reference Filter mS	28 (1Ch)	28 (1Ch)			19 (13h)
d5-03	Speed Limit Selection	29 (1Dh)	29 (1Dh)			20 (14h)
d5-04	Speed Limit Value %	30 (1Eh)	30 (1Eh)			21 (15h)

◆ Class 6Ah, Instance 1 - Reference Object (Continued)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
d5-05	Speed Limit Bias %	31 (1Fh)	31 (1Fh)			22 (16h)
d5-06	Reference Hold Time mS	32 (20h)	32 (20h)			23 (17h)
d5-07	Rotational Direction		39 (27h)			
d6-01	Magnetic Weakening Field	33 (22h)	33 (22h)			
d6-02	Magnetic Field Frequency Hz	34 (23h)	34 (23h)			
d6-03	Magnetic Field Forcing Function	35 (24h)	35 (24h)			
d6-05	Motor Secondary Time Constant Filter		37 (25h)			
d6-06	Field Force Limit	38 (27h)	38 (26h)			

[3] d1-09 in G5M

◆ Class 6Bh, Instance 1 - Motor Object

EX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
E1-01	Input Voltage VAC	1	1	1	1	1
E1-02	Motor Selection					2
E1-03	V/F Selection	3	3	3	3	3
E1-04	Maximum Frequency Hz	4	4	4	4	4
E1-05	Maximum Voltage VAC	5	5	5	5	5
E1-06	Base Frequency Hz	6	6	6	6	6
E1-07	Mid Frequency A Hz	7	7	7	7	7
E1-08	Mid Voltage A VAC	8	8	8	8	8
E1-09	Minimum Frequency Hz	9	9	9	9	9
E1-10	Minimum Voltage VAC	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)
E1-11	Mid Frequency B Hz	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
E1-12	Mid Voltage B VAC	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
E1-13	Base Voltage VAC	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)
E2-01	Motor 2 Motor Rated FLA	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)
E2-02	Motor 2 Motor Rated Slip Hz	16 (10h)	16 (10h)			16 (10h)
E2-03	Motor 2 No Load Current A	17 (11h)	17 (11h)	17 (11h)	17 (11h)	17 (11h)
E2-04	Motor 2 Number of Poles	18 (12h)	18 (12h)			18 (12h)
E2-05	Motor 2 Terminal Resistance Ohm	19 (13h)	19 (13h)	19 (13h)	19 (13h)	19 (13h)
E2-06	Motor 2 Leak Inductance %	20 (14h)	20 (14h)			20 (14h)
E2-07	Motor 2 Saturation Compensation 1	21 (15h)	21 (15h)			21 (15h)
E2-08	Motor 2 Saturation Compensation 2	22 (16h)	22 (16h)			22 (16h)
E2-09	Motor 2 Mechanical Loss %	23 (17h)	23 (17h)			23 (17h)
E2-10	Motor 2 Torque Compensation Iron Loss W	24 (18h)	24 (18h)			
E2-11	Motor 2 Motor Rated Power	25 (19h)	25 (19h)			
E2-12	Motor 2 Saturation Compensation 3		41 (49h)			
E3-01	Motor 2 Control Method	26 (1Ah)	26 (1Ah)			24 (18h)
E3-02	Motor 2 Maximum Frequency Hz	27 (1Bh)	27 (1Bh)			

◆ Class 6Bh, Instance 1 - Motor Object (Continued)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
E3-03	Motor 2 Maximum Voltage VAC	28 (1Ch)	28 (1Ch)			
E3-04	Motor 2 Base Frequency Hz	29 (1Dh)	29 (1Dh)			
E3-05	Motor 2 Mid Frequency Hz	30 (1Eh)	30 (1Eh)			
E3-06	Motor 2 Mid Voltage VAC	31 (1Fh)	31 (1Fh)			
E3-07	Motor 2 Minimum Frequency	32 (20h)	32 (20h)			
E3-08	Motor 2 Minimum Voltage VAC	33 (21h)	33 (21h)			
E4-01	Motor 2 Maximum Frequency Hz	34 (22h)	34 (22h)			25 (19h)
E4-02	Motor 2 Maximum Voltage VAC	35 (23h)	35 (23h)			26 (1Ah)
E4-03	Motor 2 Base Frequency	36 (24h)	36 (24h)			27 (1Bh)
E4-04	Motor 2 Mid Frequency	37 (25h)	37 (25h)			28 (1Ch)
E4-05	Motor 2 Mid Voltage	38 (26h)	38 (26h)			29 (1Dh)
E4-06	Motor 2 Minimum Frequency	39 (27h)	39 (27h)			30 (1Eh)
E4-07	Motor 2 Minimum Voltage	40 (28h)	40 (28h)			31 (1Fh)
E4-08	Motor 2 Slip Compensation Gain Motor 2		63 (3Fh)			
E4-09	Motor 2 ASR P Gain Motor 2		64 (40h)			
E4-10	Motor 2 ASR I Time Motor 2 Sec		65 (41h)			
E4-11	Motor 2 Torque Compensation Gain Motor 2		66 (42h)			
E5-01	Motor 2 Rated FLA					32 (20h)
E5-02	Motor 2 Rated Slip Hz					33 (21h)
E5-03	Motor 2 No Load Current A					34 (22h)
E5-04	Motor 2 Number of Poles					35 (23h)
E5-05	Motor 2 Terminal Resistance Ohm					36 (24h)
E5-06	Motor 2 Leakage Inductance %					37 (25h)

◆ Class 6Ch, Instance 1 - Option Object

FX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
F1-01	PG Pulses/Revolution	1	1			1
F1-02	PG Feedback Loss Selection	2	2			2
F1-03	PG Overspeed Selection	3	3			3
F1-04	PG Deviation Selection	4	4			4
F1-05	PG Rotation Selection	5	5			5
F1-06	PG Output Ratio	6	6			6
F1-07	PG Ramp PI/I Selection	7	7			7
F1-08	PG Overspeed Level %	8	8			8
F1-09	PG Overspeed Time Sec	9	9			9
F1-10	PG Deviation Level %	10 (0Ah)	10 (0Ah)			10 (0Ah)
F1-11	PG Deviation Time Sec	11 (0Bh)	11 (0Bh)			11 (0Bh)
F1-12	PG Gear Teeth 1	12 (0Ch)	12 (0Ch)			12 (0Ch)
F1-13	PG Gear Teeth 2	13 (0Dh)	13 (0Dh)			13 (0Dh)

◆ Class 6Ch, Instance 1 - Option Object (Continued)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
F1-14	PGO Detection Time Sec	14 (0Eh)	14 (0Eh)			24 (18h)
F1-21	PG Pulses/Revolution 2		49 (31h)			
F1-22	PG Rotation Selection 2		50 (32h)			
F1-23	PG Gear Teeth 1		51 (33h)			
F1-24	PG Gear Teeth 2		52 (34h)			
F1-25	Hardware PGO Channel 1		53 (35h)			
F1-26	Hardware PGO Channel 2		54 (36h)			
F2-01	AI-14 Input Selection	16 (10h)	16 (10h)			14 (0Eh)
F3-01	DI Input	17 (11h)	17 (11h)			15 (0Fh)
F4-01	AO Ch1 Selection	18 (12h)	18 (12h)			16 (10h)
F4-02	AO Ch1 Gain	19 (13h)	19 (13h)			17 (11h)
F4-03	AO Ch2 Selection	20 (14h)	20 (14h)			18 (12h)
F4-04	AO Ch2 Gain	21 (15h)	21 (15h)			19 (13h)
F4-05	AO Ch1 Bias	22 (16h)	22 (16h)			
F4-06	AO Ch2 Bias	23 (17h)	23 (17h)			
F4-07	AO Ch1 Option Card Level Selection	24 (18h)	24 (18h)			
F4-08	AO Ch2 Option Card Level Selection	25 (19h)	25 (19h)			
F5-01	DO-02 Ch1 Selection	26 (1Ah)	26 (1Ah)			20 (14h)
F5-02	DO-02 Ch2 Selection	27 (1Bh)	27 (1Bh)			21 (15h)
F5-03	DO Ch3 Output Selection	28 (1Ch)	28 (1Ch)			
F5-04	DO Ch4 Output Selection	29 (1Dh)	29 (1Dh)			
F5-05	DO Ch5 Output Selection	30 (1Eh)	30 (1Eh)			
F5-06	DO Ch6 Output Selection	31 (1Fh)	31 (1Fh)			
F5-07	DO Ch7 Output Selection	32 (20h)	32 (20h)			
F5-08	DO Ch8 Output Selection	33 (21h)	33 (21h)			
F5-09	DO-08 Selection	34 (22h)	34 (22h)			22 (16h)[4]
F6-01	BUS Fault Selection	35 (23h)	35 (23h)	35 (23h)	35 (23h)	32 (20H)[5]
F6-02	EF0 Detection	36 (24h)	36 (24h)	36 (24h)	36 (24h)	27 (1Bh)[6]
F6-03	EF0 Fault Action	37 (25h)	37 (25h)	37 (25h)	37 (25h)	28 (1Ch)[7]
F6-04	Trace Sampling Time Sec	38 (26h)	38 (26h)			29 (1Dh)[8]
F6-05	Current Monitor Unit Selection	39 (27h)	39 (27h)	39 (27h)	39 (27h)	
F6-06	Torque Reference/Torque Limit	40 (28h)	40 (28h)			
F7-01	PO-36F Selection					23 (17h)

4 F6-01 in the G5M

5 F9-06 in the G5M

6 F9-02 in the G5M

7 F9-03 in the G5M

8 F9-04 in the G5M

◆ Class 6Dh, Instance 1 - Terminal Object

HX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
H1-01	Terminal S3 Function Selection	1	1	1	1	1
H1-02	Terminal S4 Function Selection	2	2	2	2	2
H1-03	Terminal S5 Function Selection	3	3	3	3	3
H1-04	Terminal S6 Function Selection	4	4	4	4	4
H1-05	Terminal S7 Function Selection	5	5	5	5	5
H1-06	Terminal S8 Function Selection	6	6			6
H1-07	Terminal S9 Function Selection		7			
H1-08	Terminal S10 Function Selection		8			
H1-09	Terminal S11 Function Selection		9			
H1-10	Terminal S12 Function Selection		10			
H2-01	Terminal M1-M2 Function Selection	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	7
H2-02	Terminal P1 Function Selection	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	8
H2-03	Terminal P2 Function Selection	14 (0Eh)	14 (0Eh)			9
H2-04	Terminal P3 Function Selection		15 (0Fh)			
H2-05	Terminal P4 Function Selection		16 (10h)			
H3-01	Terminal A1 Signal	17 (11h)	17 (11h)			10 (0Ah)
H3-02	Terminal A1 Gain %	18 (12h)	18 (12h)	18 (12h)	18 (12h)	11 (0Bh)
H3-03	Terminal A1 Bias %	19 (13h)	19 (13h)	19 (13h)	19 (13h)	12 (0Ch)
H3-04	Terminal A3 Level	20 (14h)	20 (14h)			13 (0Dh)
H3-05	Terminal A3 Selection	21 (15h)	21 (15h)			14 (0Eh)
H3-06	Terminal A3 Gain %	22 (16h)	22 (16h)			15 (0Fh)
H3-07	Terminal A3 Bias %	23 (17h)	23 (17h)			16 (10h)
H3-08	Terminal A2 Level	24 (18h)	24 (18h)	24 (18h)	24 (18h)	17 (11h)
H3-09	Terminal A2 Selection	25 (19h)	25 (19h)	25 (19h)	25 (19h)	18 (12h)
H3-10	Terminal A2 Gain %	26 (1Ah)	26 (1Ah)	26 (1Ah)	26 (1Ah)	19 (13h)
H3-11	Terminal A2 Bias %	27 (1Bh)	27 (1Bh)	27 (1Bh)	27 (1Bh)	20 (14h)
H3-12	Filter Average Time Sec	28 (1Ch)	28 (1Ch)	28 (1Ch)	28 (1Ch)	21 (15h)
H3-13	TA1/TA2 Selection			29 (1Dh)	29 (1Dh)	
H4-01	Terminal FM Selection	30 (1Eh)	30 (1Eh)	30 (1Eh)	30 (1Eh)	22 (16h)
H4-02	Terminal FM Gain	31 (1Fh)	31 (1Fh)	31 (1Fh)	31 (1Fh)	23 (17h)
H4-03	Terminal FM Bias %	32 (20h)	32 (20h)	32 (20h)	32 (20h)	24 (18h)
H4-04	Terminal AM Selection	33 (21h)	33 (21h)	33 (21h)	33 (21h)	25 (19h)
H4-05	Terminal AM Gain %	34 (22h)	34 (22h)	34 (22h)	34 (22h)	26 (1Ah)
H4-06	Terminal AM Bias %	35 (23h)	35 (23h)	35 (23h)	35 (23h)	27 (1Bh)
H4-07	AO Level Selection	36 (24h)	36 (24h)	36 (24h)	36 (24h)	28 (1Ch)
H4-08	AO Level Selection 2	37 (25h)	37 (25h)	37 (25h)	37 (25h)	
H5-01	Serial Communication Address	38 (26h)	38 (26h)	38 (26h)	38 (26h)	29 (1Dh)
H5-02	Serial Baud Rate	39 (27h)	39 (27h)	39 (27h)	39 (27h)	30 (1Eh)
H5-03	Serial Communication Parity Selection	40 (28h)	40 (28h)	40 (28h)	40 (28h)	31 (1Fh)
H5-04	Serial Communication Fault Selection	41 (29h)	41 (29h)	41 (29h)	41 (29h)	32 (20h)
H5-05	Serial Communication Fault Detection	42 (2Ah)	42 (2Ah)	42 (2Ah)	42 (2Ah)	33 (21h)
H5-06	Serial Communication Transmit Wait Time ms	43 (2Bh)	43 (2Bh)	43 (2Bh)	43 (2Bh)	
H5-07	RTS Control Selection	44 (2Ch)	44 (2Ch)	44 (2Ch)	44 (2Ch)	

◆ Class 6Dh, Instance 1 - Terminal Object (Continued)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
H5-08	Communication Protocol Selection				53 (35h)	
H5-09	Communication Error Detection Time			54 (36h)	54 (346)	
H6-01	Pulse Input Selection	45 (2Dh)	45 (2Dh)			
H6-02	Pulse Input Selection	46 (2Eh)	46 (2Eh)			
H6-03	Pulse Input Scaling Hz	47 (2Fh)	47 (2Fh)			
H6-04	Pulse Input Gain %	48 (30h)	48 (30h)			
H6-05	Pulse Input Bias %	49 (31h)	49 (31h)			
H6-06	PI Filter Time Sec	50 (32h)	50 (32h)			
H6-07	Pulse Output Selection	51 (33h)	51 (33h)			

◆ Class 6Eh, Instance 1 - Protection Object

LX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
L1-01	Motor Overload Fault Selection	1	1	1	1	1
L1-02	Motor Overload Time Constant Minimum	2	2	2	2	2
L1-03	Motor Overheat Alarm Operation Selection	3	3	3	3	
L1-04	Motor Overload Filter Time Sec	4	4	4	4	
L1-05	Motor Overheat Filter Time	5	5	5	5	
L2-01	Power Loss Ride Through Selection	6	6	6	6	3
L2-02	Power Loss Ride Through Time	7	7	7	7	4
L2-03	Power Loss Ride Through Baseblock Time	8	8	8	8	5
L2-04	Power Loss Ride Through V/F Ramp Time Sec	9	9	9	9	6
L2-05	Undervoltage (UV1) Detection Level VDC	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	7
L2-06	KEB Frequency %	11 (0Bh)	11 (0Bh)			8
L2-07	Undervoltage Recovery Time Sec	12 (0Ch)	12 (0Ch)			
L2-08	KEB Decel Time %	13 (0Dh)	13 (0Dh)			
L3-01	Stall Prevention Accel Selection	16 (10h)	16 (10h)	16 (10h)	16 (10h)	9
L3-02	Stall Prevention Accel Level %	17 (11h)	17 (11h)	17 (11h)	17 (11h)	10 (0Ah)
L3-03	Stall Prevention Constant Horsepower Level %	18 (12h)	18 (12h)	18 (12h)	18 (12h)	11 (0Bh)
L3-04	Stall Prevention Decel Selection	19 (13h)	19 (13h)	19 (13h)	19 (13h)	12 (0Ch)
L3-05	Stall Prevention Run Selection	20 (14h)	20 (14h)	20 (14h)	20 (14h)	13 (0Dh)
L3-06	Stall Prevention Run Level %	21 (15h)	21 (15h)	21 (15h)	21 (15h)	14 (0Eh)
L3-11	Overvoltage Inhibit Selection	72 (48h)	72 (48h)			
L3-12	Overvoltage Inhibit Voltage Level	73 (49h)	73 (49h)			
L4-01	Speed Agree Level Hz	26 (1Ah)	26 (1Ah)	26 (1Ah)	26 (1Ah)	17 (11h)
L4-02	Speed Agree Width Hz	27 (1Bh)	27 (1Bh)	27 (1Bh)	27 (1Bh)	18 (12h)
L4-03	Speed Agree Level +/- Hz	28 (1Ch)	28 (1Ch)			19 (13h)
L4-04	Speed Agree Width +/- Hz	29 (1Dh)	29 (1Dh)			20 (14h)
L4-05	Reference Loss Selection	30 (1Eh)	30 (1Eh)	30 (1Eh)	30 (1Eh)	21 (15h)
L4-06	Frequency Reference At Frequency Loss	67 (43h)	67 (43h)	67 (43h)	67 (43h)	

◆ Class 6Eh, Instance 1 - Protection Object (Continued)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
L5-01	Number Of Restarts	31 (1Fh)	31 (1Fh)	31 (1Fh)	31 (1Fh)	22 (16h)
L5-02	Restart Selection	32 (20h)	32 (20h)	32 (20h)	32 (20h)	23 (17h)
L5-03	Maximum Restart Time			33 (21h)	33 (21h)	
L6-01	Torque Detection 1 Selection	34 (22h)	34 (22h)	34 (22h)	34 (22h)	25 (19h)
L6-02	Torque Detection 1 Level %	35 (23h)	35 (23h)	35 (23h)	35 (23h)	26 (1Ah)
L6-03	Torque Detection 1 Time Sec	36 (24h)	36 (24h)	36 (24h)	36 (24h)	27 (1Bh)
L6-04	Torque Detection 2 Selection	37 (25h)	37 (25h)			28 (1Ch)
L6-05	Torque Detection 2 Level %	38 (26h)	38 (26h)			29 (1Dh)
L6-06	Torque Detection 2 Time Sec	39 (27h)	39 (27h)			30 (1Eh)
L7-01	Torque Limit Forward %	40 (28h)	40 (28h)			31 (1Fh)
L7-02	Torque Limit Reverse %	41 (29h)	41 (29h)			32 (20h)
L7-03	Torque Limit Forward Regeneration %	42 (2Ah)	42 (2Ah)			33 (21h)
L7-04	Torque Limit Reverse Regeneration %	43 (2Bh)	43 (2Bh)			34 (22h)
L7-06	Torque Limit Time mS					
L7-07	Torque Limit Selection					
L8-01	Dynamic Braking Resistor Protection	46 (2Eh)	46 (2Eh)	46 (2Eh)	46 (2Eh)	37 (25h)
L8-02	Overheat Pre-Alarm Level Deg	47 (2Fh)	47 (2Fh)	47 (2Fh)	47 (2Fh)	38 (26h)
L8-03	Overheat Pre-Alarm Selection	48 (30h)	48 (30h)	48 (30h)	48 (30h)	39 (27h)
L8-04	Overheat (OH1) Fault Level	49 (31h)				
L8-05	Input Phase Loss Selection	50 (32h)	50 (32h)			41 (29h)
L8-06	Input Phase Loss Level %	51 (33h)		51 (33h)	51 (33h)	
L8-07	Output Phase Loss Selection	52 (34h)	52 (34h)			43 (2Bh)
L8-08	Output Phase Loss Level %	53 (35h)	53 (35h)			
L8-09	Ground Fault Selection	54 (36h)	54 (36h)	54 (36h)	54 (36h)	
L8-10	Fan Control Selection	55 (37h)	55 (37h)	55 (37h)	55 (37h)	
L8-11	Fan Off Time Sec	56 (38h)	56 (38h)	56 (38h)	56 (38h)	
L8-12	Ambient Temperature Setting Deg	57 (39h)	57 (39h)	57 (39h)	57 (39h)	
L8-13	Undervoltage (UV3) Detection			58 (3Ah)	58 (3Ah)	
L8-14	Inverter Overload (OL2) Selection			59 (3Bh)	59 (3Bh)	
L8-15	Inverter Overload Characteristic (OL2) at Low-Speed	60 (3Ch)	60 (3Ch)	60 (3Ch)	60 (3Ch)	
L8-18	Soft CLA Selection	63 (3Fh)	63 (3Fh)	63 (3Fh)	63 (3Fh)	
L8-19	Overheat Frequency Reference Reduction Level			64 (40h)	64 (40h)	

◆ Class 6Fh, Instance 1 - Operator Object

OX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]				
		F7U	G7U	P7U	E7U	G5M
o1-01	User Monitor Selection	1	1	1	1	1
o1-02	Power On Monitor	2	2	2	2	2
o1-03	Display Scaling	3	3	3	3	3
o1-04	Display Units	4	4			4
o1-05	Address Display	5	5	5	5	5
o1-06	User Monitor Selection			24	24	
o1-07	2nd Line User Monitor			25	25	
o1-08	3rd Line User Monitor			26	26	
o2-01	Local/ Remote Key	6	6	6	6	6
o2-02	Keypad Operator STOP Key Select	7	7	7	7	7
o2-03	User Defaults	8	8	8	8	8
o2-04	Inverter Model Number	9	9	9	9	9
o2-05	Keypad Operator MOP	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)
o2-06	Keypad Operator Detection	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
o2-07	Elapsed Time Setting	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
o2-08	Elapsed Time Selection	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)
o2-09	Initialization Mode Selection	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)
o2-10	Fan Operation Time Hr	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)	
o2-12	Fault Trace	17 (11h)	17 (11h)	17 (11h)	17 (11h)	
o2-14	kWh Monitor Initialization	19 (13h)	19 (13h)	19 (13h)	19 (13h)	
o2-15	Hand Function Key Selection			20 (14h)	20 (14h)	
o3-01	Copy Function Selection	22 (16h)	22 (16h)	22 (16h)	22 (16h)	
o3-02	Read Allowed Selection	23 (17h)	23 (17h)	23 (17h)	23 (17h)	

◆ Class 70h, Instance 1 - G5M CASE Object*

*CASE Parameters are only used in custom drive software.
PX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]
		G5M
P1-01	Case Parameter 1	1
P1-02	Case Parameter 2	2
P1-03	Case Parameter 3	3
P1-04	Case Parameter 4	4
P1-05	Case Parameter 5	5
P1-06	Case Parameter 6	6
P1-07	Case Parameter 7	7
P1-08	Case Parameter 8	8
P1-09	Case Parameter 9	9
P1-10	Case Parameter 10	10 (0Ah)
P2-01	Case Parameter 11	17 (11h)
P2-02	Case Parameter 12	18 (12h)
P2-03	Case Parameter 13	19 (13h)
P2-04	Case Parameter 14	20 (14h)
P2-05	Case Parameter 15	21 (15h)
P2-06	Case Parameter 16	22 (16h)
P2-07	Case Parameter 17	23 (17h)
P2-08	Case Parameter 18	24 (18h)
P2-09	Case Parameter 19	25 (19h)
P2-10	Case Parameter 20	26 (1Ah)
P3-01	Case Parameter 21	33 (21h)
P3-02	Case Parameter 22	34 (22h)
P3-03	Case Parameter 23	35 (23h)
P3-04	Case Parameter 24	36 (24h)
P3-05	Case Parameter 25	37 (25h)
P3-06	Case Parameter 26	38 (26h)
P3-07	Case Parameter 27	39 (27h)
P3-08	Case Parameter 28	40 (28h)
P3-09	Case Parameter 29	41 (29h)
P3-10	Case Parameter 30	42 (2Ah)

◆ Class 70h, Instance 1 - Factory Adjustment Object

NX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]			
		F7U	G7U	P7U	E7U
N1-01	Hunting Prevention Selection	1	1	1	1
N1-02	Hunting Prevention Gain	2	2	2	2
N2-01	AFR Gain	5	5		
N2-02	AFR Time mS	6	6		
N2-03	AFR Time 2 mS	7	7		
N3-01	High Slip Braking Decel Width %	9	9	9	9
N3-02	High Slip Braking Current Reference %	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)
N3-03	High Slip Braking Dwell Time Sec	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
N3-04	High Slip Braking Overload Time Sec	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
N4-07	Observer Integral Time mS		27 (1Bh)		
N4-08	Observer Proportional Gain		28 (1Ch)		
N4-10	Proportional Gain on Hi-Speed Side of Observer		30 (1Eh)		
N4-11	Observer Switching Frequency Hz		31 (1Fh)		
N4-15	Low Speed Regenerative Stability Coefficient 1		35 (23h)		
N4-17	Gain for Feeder Resistance Adjustment		37 (25h)		
N4-18	Gain for Feeder Resistance Adjustment		38 (26h)		
N4-28	Observer Switching Frequency 2 Hz		48 (30h)		
N4-29	Torque Adjustment Gain 2		53 (35h)		
N4-30	Low Speed Regenerative Stability Coefficient 2		54 (36h)		
N4-32	Observer Gain Modulation Frequency Hz		56 (37h)		
N4-33	Observer Gain Modulation Frequency 2 Hz		57 (38h)		
N4-34	Observer Gain Modulation Rate %		58 (39h)		
N4-35	U1-48 Gain Reduction Coefficient		59 (3Ah)		
N4-39	Flux Level at Low Frequency %		63 (3Fh)		
N4-40	Current Stability Coefficient at Low Speed		64 (40h)		
N4-43	Speed Estimation Compensation Gain		67 (43h)		
N5-01	Feed Forward Control Selection		49 (31h)		
N5-02	Motor Acceleration Time Sec		50 (32h)		
N5-03	Feed Forward Control Ratio Gain		51 (33h)		

◆ Class 71h, Instance 1 - 7-Series CASE Parameter Object*

*CASE Parameters are only used in custom drive software.
PX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]			
		F7U	G7U	P7U	E7U
P1-01	Case Parameter 1	1	1	1	1
P1-02	Case Parameter 2	2	2	2	2
P1-03	Case Parameter 3	3	3	3	3
P1-04	Case Parameter 4	4	4	4	4
P1-05	Case Parameter 5	5	5	5	5
P1-06	Case Parameter 6	6	6	6	6
P1-07	Case Parameter 7	7	7	7	7
P1-08	Case Parameter 8	8	8	8	8
P1-09	Case Parameter 9	9	9	9	9
P1-10	Case Parameter 10	10 (0Ah)	10 (0Ah)	10 (0Ah)	10 (0Ah)
P2-01	Case Parameter 11	11 (0Bh)	11 (0Bh)	11 (0Bh)	11 (0Bh)
P2-02	Case Parameter 12	12 (0Ch)	12 (0Ch)	12 (0Ch)	12 (0Ch)
P2-03	Case Parameter 13	13 (0Dh)	13 (0Dh)	13 (0Dh)	13 (0Dh)
P2-04	Case Parameter 14	14 (0Eh)	14 (0Eh)	14 (0Eh)	14 (0Eh)
P2-05	Case Parameter 15	15 (0Fh)	15 (0Fh)	15 (0Fh)	15 (0Fh)
P2-06	Case Parameter 16	16 (10h)	16 (10h)	16 (10h)	16 (10h)
P2-07	Case Parameter 17	17 (11h)	17 (11h)	17 (11h)	17 (11h)
P2-08	Case Parameter 18	18 (12h)	18 (12h)	18 (12h)	18 (12h)
P2-09	Case Parameter 19	19 (13h)	19 (13h)	19 (13h)	19 (13h)
P2-10	Case Parameter 20	20 (14h)	20 (14h)	20 (14h)	20 (14h)
P3-01	Case Parameter 21	21 (15h)	21 (15h)	21 (15h)	21 (15h)
P3-02	Case Parameter 22	22 (16h)	22 (16h)	22 (16h)	22 (16h)
P3-03	Case Parameter 23	23 (17h)	23 (17h)	23 (17h)	23 (17h)
P3-04	Case Parameter 24	24 (18h)	24 (18h)	24 (18h)	24 (18h)
P3-05	Case Parameter 25	25 (19h)	25 (19h)	25 (19h)	25 (19h)
P3-06	Case Parameter 26	26 (1Ah)	26 (1Ah)	26 (1Ah)	26 (1Ah)
P3-07	Case Parameter 27	27 (1Bh)	27 (1Bh)	27 (1Bh)	27 (1Bh)
P3-08	Case Parameter 28	28 (1Ch)	28 (1Ch)	28 (1Ch)	28 (1Ch)
P3-09	Case Parameter 29	29 (1Dh)	29 (1Dh)	29 (1Dh)	29 (1Dh)
P3-10	Case Parameter 30	30 (1Eh)	30 (1Eh)	30 (1Eh)	30 (1Eh)

◆ Class 72h, Instance 1, Auto-tune Object

TX-XX parameters all share the same service (GET/SET), data type (Word) and number of bytes (2)

Parameter	Name	Attribute [hex]			
		F7U	G7U	P7U	E7U
T1-00	Motor Selection	1	1		
T1-01	Tuning Mode Selection	2	2		
T1-02	Motor Rated Power kW	3	3	3	3
T1-03	Motor Rated Voltage VAC	4	4		
T1-04	Rated Current A	5	5	5	5
T1-05	Rated Frequency Hz	6	6		
T1-06	Number of Poles	7	7		
T1-07	Rated Speed RPM	8	8		
T1-08	Number PG Pulses Per Revolution PPR	9	9		

Hexadecimal/Decimal Conversion

Table B.1 – Hexadecimal/Decimal Conversions

Hex	Decimal	Hex	Decimal	Hex	Decimal	Hex	Decimal	Hex	Decimal
0	0	34	52	68	104	9C	156	D0	208
1	1	35	53	69	105	9D	157	D1	209
2	2	36	54	6A	106	9E	158	D2	210
3	3	37	55	6B	107	9F	159	D3	211
4	4	38	56	6C	108	A0	160	D4	212
5	5	39	57	6D	109	A1	161	D5	213
6	6	3A	58	6E	110	A2	162	D6	214
7	7	3B	59	6F	111	A3	163	D7	215
8	8	3C	60	70	112	A4	164	D8	216
9	9	3D	61	71	113	A5	165	D9	217
A	10	3E	62	72	114	A6	166	DA	218
B	11	3F	63	73	115	A7	167	DB	219
C	12	40	64	74	116	A8	168	DC	220
D	13	41	65	75	117	A9	169	DD	221
E	14	42	66	76	118	AA	170	DE	222
F	15	43	67	77	119	AB	171	DF	223
10	16	44	68	78	120	AC	172	E0	224
11	17	45	69	79	121	AD	173	E1	225
12	18	46	70	7A	122	AE	174	E2	226
13	19	47	71	7B	123	AF	175	E3	227
14	20	48	72	7C	124	B0	176	E4	228
15	21	49	73	7D	125	B1	177	E5	229
16	22	4A	74	7E	126	B2	178	E6	230
17	23	4B	75	7F	127	B3	179	E7U	231
18	24	4C	76	80	128	B4	180	E8	232
19	25	4D	77	81	129	B5	181	E9	233
1A	26	4E	78	82	130	B6	182	EA	234
1B	27	4F	79	83	131	B7	183	EB	235
1C	28	50	80	84	132	B8	184	EC	236
1D	29	51	81	85	133	B9	185	ED	237
1E	30	52	82	86	134	BA	186	EE	238
1F	31	53	83	87	135	BB	187	EF	239
20	32	54	84	88	136	BC	188	F0	240
21	33	55	85	89	137	BD	189	F1	241
22	34	56	86	8A	138	BE	190	F2	242
23	35	57	87	8B	139	BF	191	F3	243
24	36	58	88	8C	140	C0	192	F4	244
25	37	59	89	8D	141	C1	193	F5	245
26	38	5A	90	8E	142	C2	194	F6	246
27	39	5B	91	8F	143	C3	195	F7	247
28	40	5C	92	90	144	C4	196	F8	248
29	41	5D	93	91	145	C5	197	F9	249
2A	42	5E	94	92	146	C6	198	FA	250
2B	43	5F	95	93	147	C7	199	FB	251
2C	44	60	96	94	148	C8	200	FC	252
2D	45	61	97	95	149	C9	201	FD	253

Table B.1 – Hexadecimal/Decimal Conversions										
Hex	**Decimal**	**Hex**	**Decimal**	**Hex**	**Decimal**	**Hex**	**Decimal**	**Hex**	**Decimal**
2E	46	62	98	96	150	CA	202	FE	254
2F	47	63	99	97	151	CB	203	FF	255
30	48	64	100	98	152	CC	204	100	256
31	49	65	101	99	153	CD	205		
32	50	66	102	9A	154	CE	206		
33	51	67	103	9B	155	CF	207		

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